

FEBRUARY 1, 1949

• TRACTORS • TRAILERS • BODIES • ENGINES • AIRCRAFT

• FARM & ROAD MACHINERY • PARTS • ACCESSORIES

EQUIPMENT • FOR PRODUCTION • SERVICE • MAINTENANCE

AUTOMOTIVE INDUSTRIES

PASSENGER CARS • MOTOR TRUCKS • BUSES

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Underground in a "Hot Lab"

The New Chevrolets

Pontiac's 1949 Models

Plymouth Introduces 111-Inch Wheelbase Car

Status of Preparedness Plans for Industry

Caterpillar's Huge Diesel Plant

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SUPERLA Soluble Oil

Gain these benefits for your grinding operations

AIMING at higher production and economy, a midwest plant tried various soluble oils for the cylindrical grinding of cast-iron automotive pistons. Approximately .001 of an inch of stock is removed. Six Norton grinding machines are used on the job.

Of the products tried, Superla Soluble Oil proved superior to any and helped this plant reach its goal through these benefits:

Fewer wheel dressings. 70 to 80 pistons are produced before wheels need dressing as compared to an average of 30 to 40 pistons obtained with other soluble oils. This amounts to a big saving through reduced time and labor for dressing wheels.

Greater production. Less interruption for wheel main-

tenance adds approximately 40 minutes to the daily production time of each machine.

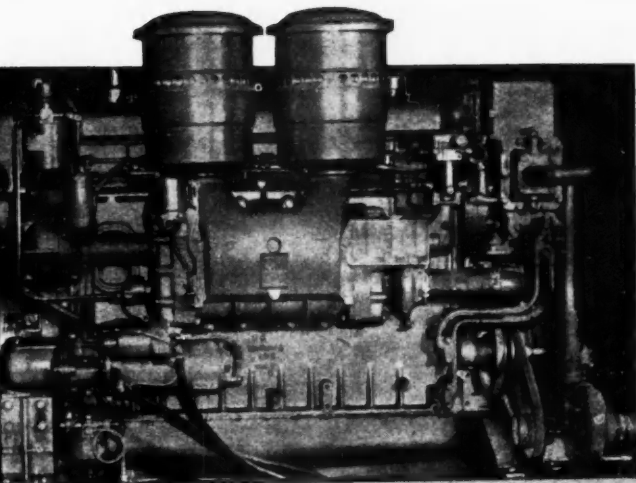
The shop foreman reports still other advantages in using Superla Soluble Oil. Piston diameters are easily kept within a tolerance of .0005 to .001 of an inch. There are no rusting troubles. Superla emulsions do not turn rancid and produce objectionable odors.

Why not gain these advantages offered by Superla Soluble Oil—advantages that will help you, in turn, to get greater production and economy in your plant. If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Standard Cutting Oil Engineer nearest you.

STANDARD OIL COMPANY (INDIANA)

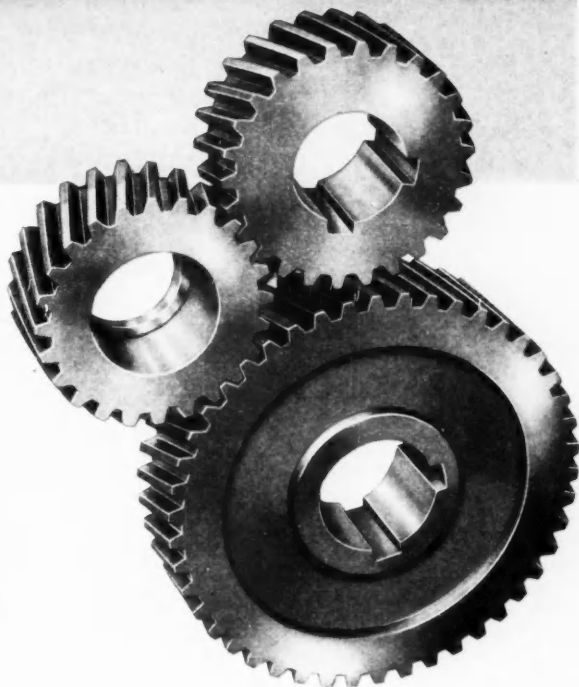


GENERAL MOTORS DIESEL
POWER UNIT equipped with Cotta
transmission SR-10-E. Installed at
Halifax Rolling Mills, Halifax, Vir-
ginia. A water-pumping application



Cotta REDUCTION UNITS

... found in many industrial applica-
tions: cranes, shovels, rock crushers,
generators, pumps, and the like. Par-
ticularly suited for adjusting high-
speed Diesel output to the r.p.m. of
slower-speed units. Available in a
broad range of ratios... Input torque
ranges from 150 foot pounds to 1350
foot pounds. COTTA precision-en-
gineered throughout.



THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, di-
mensions, and complete specifications. State your
problem — COTTA engineers will help you select the
right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



COTTA

HEAVY-DUTY
TRANSMISSIONS

"Engineered-to-order"

THIS 80-TON TRAILER

points a way to...

6½ TONS LESS DEADWEIGHT...

permits 80-ton trailer body to carry a correspondingly larger payload. Built from the low alloy high strength Mayari R steel produced by Bethlehem Steel Co., this trailer has been operating 280 days per year ever since 1937 ...with only minor repairs.



- ...REDUCE DEADWEIGHT
- ...ADD LOAD CAPACITY
- ...INCREASE DURABILITY

Drive ahead to definite economies . . . by using high strength low alloy steels containing nickel.

These steels provide:

- 1 High strength in the as-rolled condition, permitting important weight reductions.
- 2 Excellent response to such fabricating operations as forming and welding.
- 3 Exceptional resistance to corrosion, abrasion and impact.

Thin, light sections of these economical steels afford the same strength as thicker, heavier sections of plain carbon steel. In addition, they provide good toughness and ductility at both room and sub-zero temperatures.

High strength nickel alloyed steels may be fabricated as easily as carbon steel. They often reduce unit-labor costs, and their resistance to abrasion, erosion and many types of corrosion helps substantially to lengthen equipment life.

Moderate in cost, and produced under various trade names by leading steel companies, high strength steels containing nickel along with other alloying elements pay for themselves by reducing maintenance, extending service life and eliminating useless deadweight.

Consult us on their use in your products or equipment.



NEW TYPE TRUCK BODY...

suspends entire payload from longitudinal roof members. Designed to carry cases of bottled beverages, essential strength is attained and weight is reduced

substantially by using roof members, frames and cover lifting arms made from "Yoloy" nickel-copper steel produced by The Youngstown Sheet & Tube Co., Youngstown 1, Ohio.



Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK 5, N.Y.

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

February 1, 1949

Vol. 100, No. 3

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YOUNG Equipment Cools GIANT EARTH MOVERS



Large capacity, efficient heat transfer, and sturdy construction are features of Young automotive cooling systems. Manufacturers of mammoth earth moving and road building machinery, like that shown above, know that Young-engineered equipment is designed to maintain optimum engine temperatures under the most strenuous duty, and is built to provide long-lasting, economical service.

SEND FOR NEW CATALOG

Young's entire line of Heat Transfer Products is illustrated in the colorful, new General Catalog No. 148. Your written request will bring a copy promptly. Detailed information about any Young product is available without obligation.



YOUNG HEAT TRANSFER PRODUCTS

AUTOMOTIVE AND INDUSTRIAL PRODUCTS

Gas, gasoline, Diesel engine cooling, radiators • Jacket water coolers • Heat exchangers • Intercoolers • Condensers • Evaporating coolers • Oil coolers • Gas coolers • Atmospheric cooling and condensing units • Super-charger inter-coolers • Aircraft heat transfer equipment

HEATING, COOLING AND AIR CONDITIONING PRODUCTS

Convectors • Unit Heaters • Heating coils • Cooling coils • Evaporators • Air conditioning units •

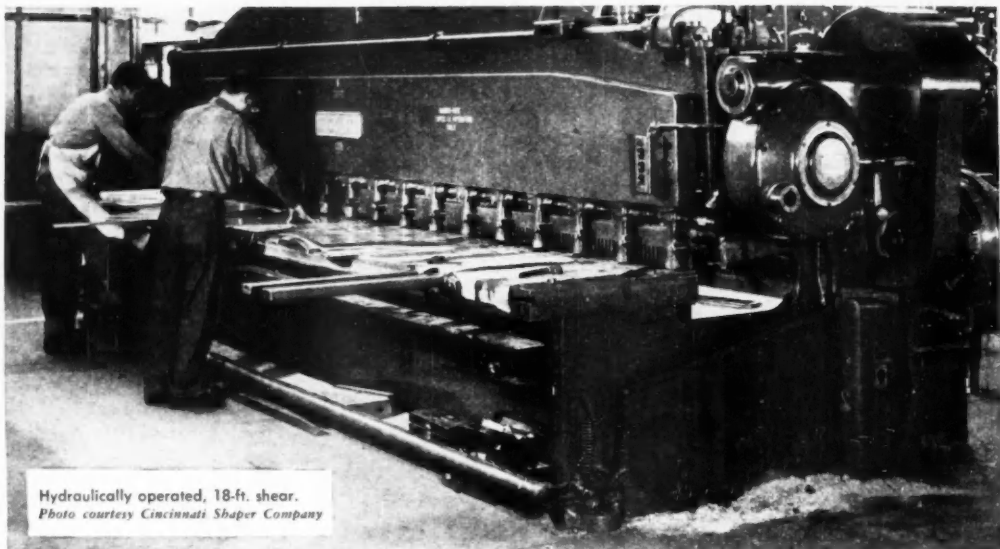
YOUNG RADIATOR CO.

Dept. 109-B Racine, Wis., U.S.A.

Sales and Engineering Offices in All Principal Cities

STOP

rust and sludge BEFORE THEY START



Hydraulically operated, 18-ft. shear.
Photo courtesy Cincinnati Shaper Company

Keep hydraulic systems clean by using Texaco Regal Oils (R & O)

You by-pass a lot of trouble and expense when you use *Texaco Regal Oils (R & O)* to assure smooth, trouble-free operation in your hydraulic systems. These turbine-grade oils are inhibited against rust and oxidation, and have been specially processed to prevent foaming.

The rust inhibitor in *Texaco Regal Oils (R & O)* "plates out" on the metal it contacts, so that air and moisture cannot reach and rust it. And *Texaco Regal Oils (R & O)* are

especially inhibited to thoroughly resist oxidation — the main cause of sludge. Thus, the main causes of stoppages are avoided before they get a start.

Texaco Regal Oils (R & O) give longer service than uninhibited oils . . . and you can get them in all needed viscosities. *Texaco Regal Oils (R & O)* are recommended or approved by leading hydraulic equipment manufacturers, many of whom ship their units filled with these fine oils.

A Texaco Lubrication Engineer will gladly help you get greater efficiency and economy in the operation of your hydraulic equipment. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



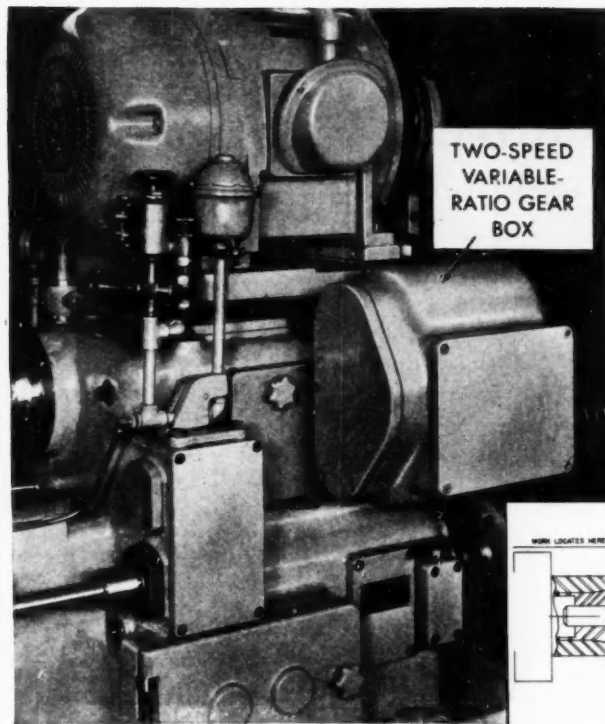
TEXACO Regal Oils (R & O)

FOR ALL HYDRAULIC UNITS

Tune in . . . TEXACO STAR THEATRE presents MILTON BERLE every Wednesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

MACHINE OF THE MONTH

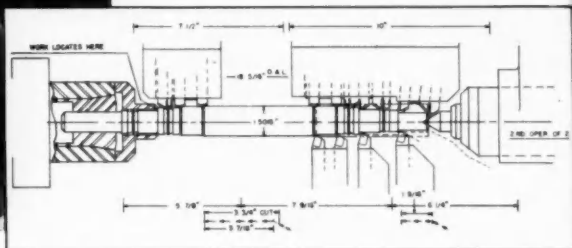
PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



Combined Turning and Squaring Operations at Different Cutting Speeds Now Possible with Lo-swing Automatically Controlled Two-Speed Headstock

Left. View of two-speed, Variable-Ratio Gear Box with Belt Guards removed.

Below. Tooling layout for electric motor shaft.



Problem: To turn, face and undercut shoulders on electric motor shafts, using cemented carbide tools for the turning operations and high speed steel tools for facing, grooving and chamfering operations which require a very smooth finish. Both operations to be made in one handling with automatic spindle speed change between the turning and squaring operations.

Solution: The Model "LR" Automatic Lo-swing Lathe selected for this job was equipped with a Two-Speed, Variable-Ratio, Gear Box shown in the illustration. The speed change from high to low and back to high again in a single machine cycle is controlled by two adjustable cams, mounted on the main cam shaft, which may be set to operate the multiple disc clutch at any time during the machine cycle. The ratio between the high and low speeds may be modified through pick-off gears to suit special conditions without removing or dismantling the gear box.

The tooling layout shows the second of two operations on

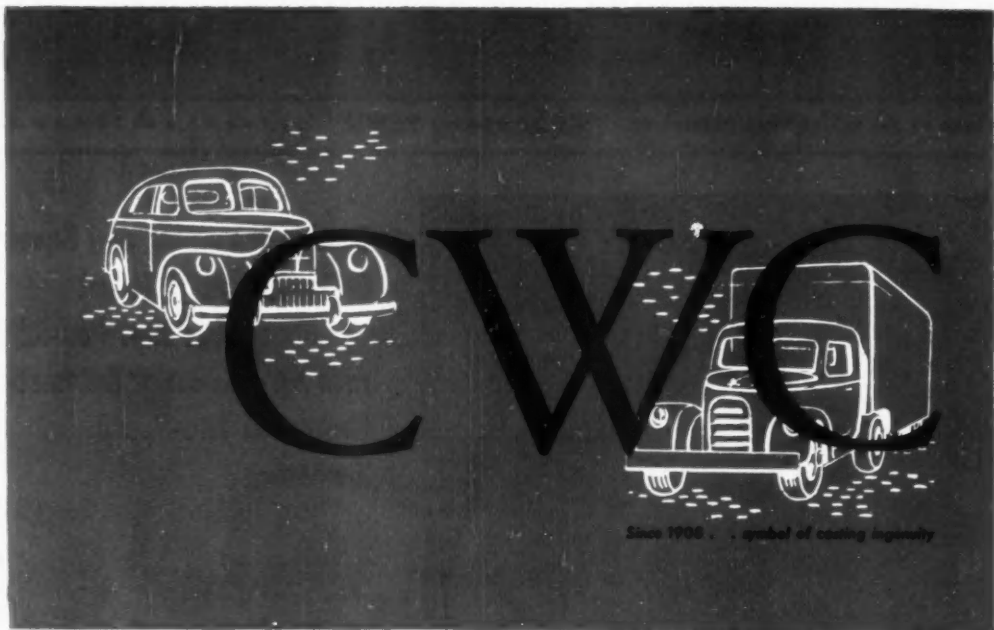
a 1½" diameter electric motor shaft. The shaft is held and driven, on a previously turned diameter, in an air-operated collet chuck which grips the shaft well in from the end, exposing only the part to be machined. This method reduces the shaft's effective length and eliminates springing due to the rigid grip of the collet. The work is positively located from a previously finished shoulder, insuring accuracy of shoulder lengths.

The shaft diameters are turned with sintered carbide tools mounted on the front carriage, cutting at a surface speed of 350 ft. per minute. The squaring and forming tools are mounted on the rear slide and operate at a surface speed of 70 ft. per minute, insuring a very high polished surface on the shoulders and formed grooves. This combination assures high production, coupled with smoothly finished shoulders, both of which are very desirable on electric motor shafts.

Consult Seneca Falls engineers for assistance in solving your automatic turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH Lo-swing



source of most that is new

Men in the automotive industry have long recognized CWC as the source of most that is new in casting iron and steel. Because of CWC advanced metallurgical engineering, precise control of the metal before it is poured, and mechanized facilities for volume production, great developments in castings have been made possible. From the five Campbell, Wyant and Cannon foundries come many thousands of *cast* cylinder blocks and heads, *cast* pistons, *cast* gears, *centrifugally cast* cylinder liners and revolutionary *cast* camshafts. These, and scores of other CWC castings are incorporated in leading automobiles, contributing to better design and operation, and to greater economy.

CWC

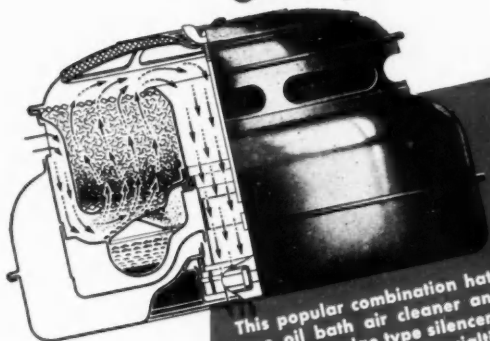
Campbell, Wyant and Cannon Foundries—Muskegon, Michigan, HENRY STREET PLANT • SANFORD STREET PLANT
BROADWAY PLANT, South Haven, Michigan, NATIONAL MOTOR CASTINGS DIV • Lansing, Michigan, CENTRIFUGAL FUSING CO.

CAMPBELL, WYANT AND CANNON FOUNDRY COMPANY

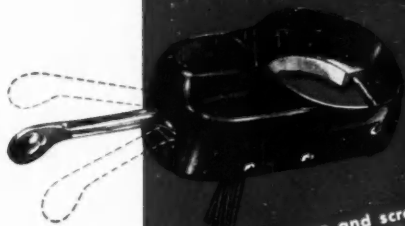
MUSKEGON, MICHIGAN

THE AUTOMOTIVE INDUSTRY GIVES EVER-INCREASING RECOGNITION

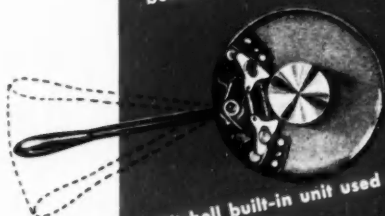
to these UNITED products



This popular combination hat type oil bath air cleaner and silencer — bulge type silencer originated by United Specialties Company — is the most copied type now used as standard equipment by independents in the automobile industry.



Mitchell clamp-on and screw type semi-automatic directional signal switch units for cars, buses, trucks, tractors.



Mitchell built-in unit used on passenger cars.

UNITED Oil Bath Air Cleaners

United Specialties Company has produced more than 10,000,000 air cleaners — protection for every type of internal combustion engine.

- Pioneer of special air cleaner designs for passenger cars, trucks, tractors and industrial engines.
- More than 260 models — a size and type for every kind of internal combustion engine.
- United Oil Bath Air Cleaners have over 99 percent dirt-trapping efficiency.
- Over 25 years of close cooperation with automobile designers.

MITCHELL Semi-Automatic Directional Signal Switch

Mitchell units are being installed on cars, trucks, buses and tractors in constantly increasing numbers for greater turning safety.

- Simple to operate — Lever on steering post controls flashing right or left turn signal.
- 3 signal switch Models — Built-in, clamp-on and screw type units.
- All three types available for installation as original equipment or for field installation in the after market.

United Specialties' 25 years of experience in the automotive, agricultural and industrial power industries is yours to use. Consult our sales engineers on your design application problems.

UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION, CHICAGO 28
MITCHELL DIVISION, PHILADELPHIA 36

AIR CLEANERS

WHEEL GOODS

METAL STAMPINGS

DOVETAILS

IGNITION AND DIRECTIONAL SIGNAL SWITCHES

ROLLED SHAPES



How much do MACHINE MINUTES cost you?

Figure your machining speeds—your operator time—your daily requirements—and your down-time. It will show you why more and more smart production men are turning to the No. 12 Hydraulic for a consistent volume of work.

GISHOLT No. 12 HYDRAULIC AUTOMATIC LATHE

These are important factors in cutting the cost of machine minutes—and in cutting the unit cost of many parts.

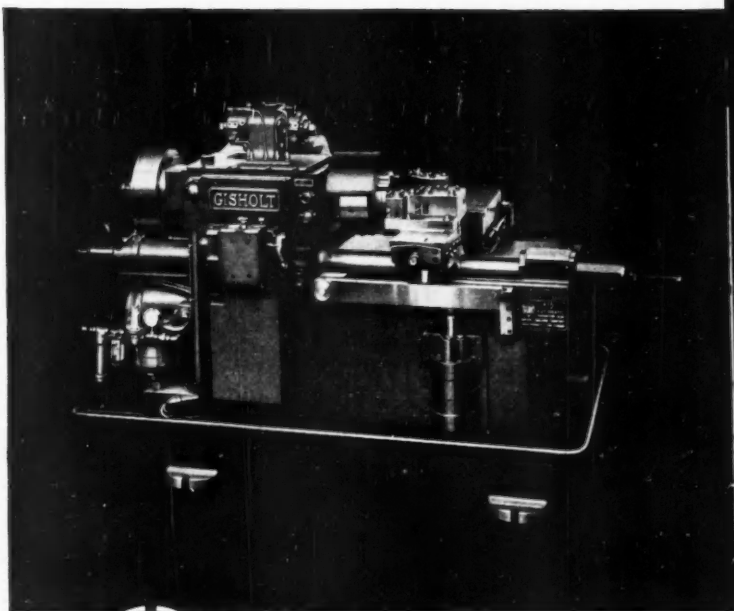
Easier Job Set-ups—No cams or drums. All adjustment points for slide control are conveniently placed between shoulder and knee levels—open and accessible. Tool blocks and tool bits are simple to position. There's no time lost here.

Faster Machining—This advanced automatic lathe has the speed and ruggedness for the toughest high production work.

Easy to Operate—One operator can tend two or more machines. Tool bits are quickly adjusted or replaced during runs.

Simple Construction—There are fewer parts requiring adjustment or replacement. You expect less and have less down-time with the No. 12 Hydraulic. Write for the catalog—Form 1104A.

**GISHOLT
MACHINE COMPANY**
MADISON 10, WIS.



THE GISHOLT ROUND TABLE represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

If you
are using
carburizing
steels...



Here's where it pays to use U-S-S SuperKore Steels

In many applications like these	in which these steels are generally used	you will save money by using
Aircraft gears, shafts, pinions, etc.	E-3310, E-9310 or equivalent AMS Specification	U-S-S SuperKore A
Heavy duty truck and tractor gears, shafts, pinions, etc.	3316, 9316	U-S-S SuperKore AA
Heavily loaded gears, shafts, pinions etc. and carburized parts used in oil well drilling industry.	4815, 4820	U-S-S SuperKore B
Gears, shafts, pinions, etc.	4317, 4320	U-S-S SuperKore C

Cut your Costs with U-S-S SUPERKORE steels

• There's been a lot of talk lately about "dollar metallurgy." It's just a fancy name for metallurgical research that aims to give the steel user more for his money in the way of reduced costs and better product performance. If you want to know how it pans out in reducing the cost of gears, shafts, and pinions subjected to heavy loads, put U-S-S SUPERKORE Steels to work.

This is what you'll discover: You'll find that when SUPERKORE Steels are applied, where they should be, you can obtain the same high-core-strength-plus-toughness formerly obtainable only with more highly alloyed carburizing steels. But your costs for steel and your manufacturing costs will be less.

That is because our metallurgists had lower-users'-costs in mind when they set out to develop U-S-S SUPERKORE. Because SUPERKORE Steels are lower in total alloy content they cost less to start with. And because the alloying elements are used more effectively and the steels are further improved by special manufacturing practices, SUPER-

KORE Steels have improved carburizing characteristics. They have better machinability, and they are easier to anneal. Therefore they can be turned into superior finished parts at lower cost.

U-S-S SUPERKORE Steels are now available in four different grades—each designed for a specific type of heavy duty service. Find out where you can apply them to reduce your costs, to simplify inventory and specification details. To guide you in their most economical and practical application, the men who developed SUPERKORE will be glad to assist you. The "Superkore Booklet" will give you further interesting information. You can obtain a copy by writing to Carnegie-Illinois Steel Corporation, Room 2070 Carnegie Building, Pittsburgh 30, Pennsylvania.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY,
WAREHOUSE DISTRIBUTORS, COAST-TO COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carillooy Steels

ELECTRIC FURNACE OR OPEN HEARTH
COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

UNITED STATES STEEL

HELPFUL REMINDERS

Full report should be attached to the following design points



Washing

Spray coverage should be carefully planned—method of application can also be a vital factor.

Baking

Considerable study can be given to whether paint drying is best effected by a movement of the heated air or by the application of heat alone.



Rust-Proofing

In addition to the above—drain lengths and methods of application should be carefully studied to avoid dilution of succeeding stages.



Spray Painting

Space allotted per operator but not less than 100 sq. ft. of exhaust intake.

Flo-Coating

Here again full coverage of part is of prime importance. Safety and comfort factor.

Complete finishing systems

Coordinated FINISHING EQUIPMENT!



SEE OUR CATALOG in

SWEET'S FILE
MECHANICAL INDUSTRIES

PETERS-DALTON Inc.



17920 EYAN ROAD • DETROIT 32, MICHIGAN

The REDUCTION OF COST in your Paint Finishing Processes is of prime importance to the forward-looking industrial manager. Peters-Dalton sales engineers are specially prepared to point out time and labor-saving features for your present or contemplated finishing system. At the right are shown photos of a new complete Bonderizing and Flo-coating system recently installed in the plant of a large industrial cast manufacturer, Cribb-Federal, Inc. of Waukegan, Wisconsin.

A monorail type, straight line system presented an ideal manual loading and unloading condition. The system itself is completely automatic. To coat we use a space, compensating-type and rollers and built with wear and tear in mind. In order to afford a faster heat load, the Bake Oven was equipped in the center.

The Ovens are heated with direct oil-fired air heaters, the bonderizing solution is applied with direct oil-fired immersion heaters. The finishing of the prime coat presents shorter drip time, paint saving and a smooth, uniform coating.

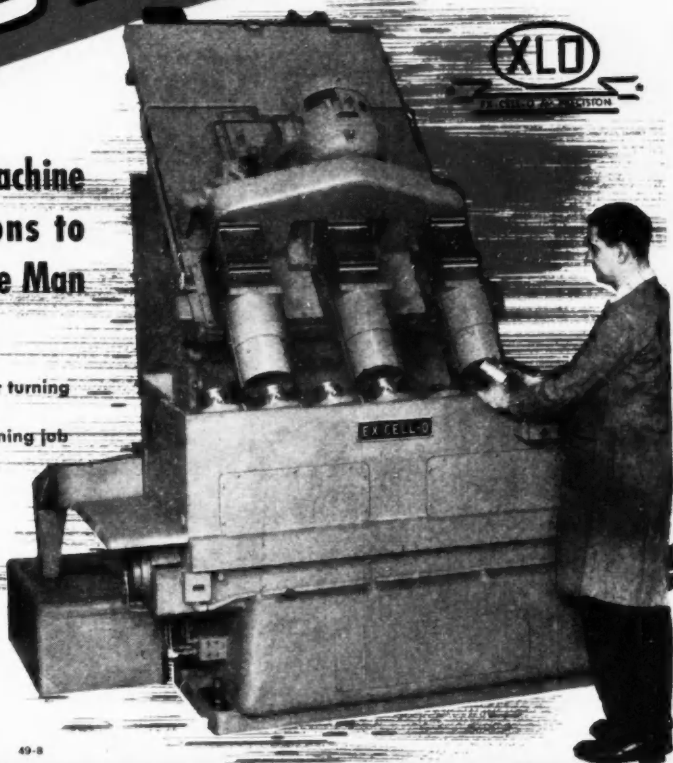
YOU, too, can get BETTER PLANNING, BETTER ENGINEERING and BETTER RESULTS in a Peters-Dalton Paint Finishing System.

Want to
**CUT
COSTS?**

See
EX-CELL-O

EX-CELL-O Special Machine Combines Operations to Save Handling...Save Man Hours...Save Space

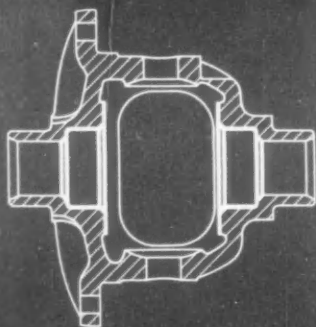
This Ex-Cell-O Special Machine for turning the tapered ellipse on automotive pistons does a complicated machining job while still maintaining a high rate of production and fine finish. Ex-Cell-O used as a basis for this operation a standard Style 61 Precision Cylinder Boring Machine. Production is 180 pieces per hour net. The engineering "know-how" that makes a job like this possible is available to you through Ex-Cell-O. Write Ex-Cell-O in Detroit today!



EX-CELL-O CORPORATION DETROIT 32

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles • Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

Another Special by Cross



Now!

**An Automatic Machine
for Differential Case
Side Gear Pockets**

- ★ Bores and faces side gear pockets of differential cases.
- ★ 100 pieces per hour.
- ★ Operator merely loads and unloads and presses cycle button.
- ★ One unskilled operator can handle two machines.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

SPECIAL MACHINE TOOLS

MILLING • DRILLING • TAPPING • BORING • TURNING • SHAPING • GRINDING • HONING

**LITTLE JOB—
BIG SAVINGS**



—with EASY-FLO

Here's evidence that you can get important savings in production costs on little metal joining jobs as well as big, by low-temperature brazing with the silver alloy EASY-FLO. The job is fastening the threaded spud for the drain plug to the oil pan of a popular make automobile. And here's the "deadly parallel" of before and after EASY-FLO results.

BEFORE	NOW
Soft Soldered by hand	Brazed with EASY-FLO 35 by induction with a ring of the alloy wire preplaced.
3 men in two 8-hour shifts did 1000.	2 men in one 8-hour shift turn out 1000.
Approx. Cost per 100—\$11.00	Approx. Cost per 100—\$4.50

EASY-FLO IS READY TO CUT YOUR COSTS

The 59% cost reduction on the spud job above, is just average for what a change to EASY-FLO brazing has done for thousands of manufacturers on thousands of metal joining jobs, large and small. EASY-FLO is ready to do as much for you. We'll be glad to send a field engineer to help you determine exactly where on your work. For EASY-FLO details, write for **BULLETINS 12-A and 15.**

HANDY & HARMAN

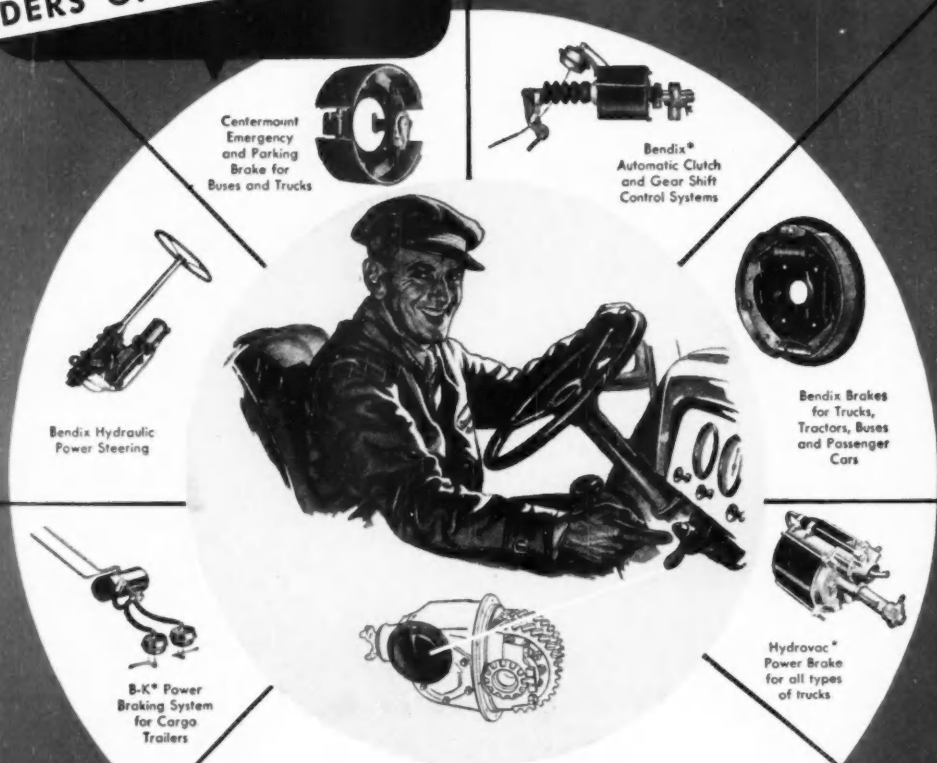
82 FULTON STREET

NEW YORK 7, N. Y.

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Bendix Products

BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES



BENDIX VACUUM-POWER SHIFT

for two-speed axles—smooth, fast, easy!

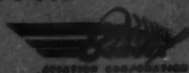
Here's another control problem solved by Bendix Vacuum-Power! With a Bendix Vacuum-Power chamber on the axle and a "Preselector" control on the instrument panel (or gear shift lever), truck drivers get an easy, positive, fast-acting, *power* shift. A flick of the finger and intake manifold vacuum does the actual work of shifting! Low original and maintenance costs make it your logical choice.

This Bendix Vacuum-Power Shift has proved a worthy companion to Timken-Detroit's great line of 2-speed truck axles, with a record of many years and billions of miles of dependable performance.

*REG. U.S. PAT. OFF.

BENDIX PRODUCTS

DIVISION of



SOUTH BEND 20, INDIANA



High Spots of This Issue

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**AUTOMOTIVE
INDUSTRIES**

Reg. U. S. Pat. Off.

Underground in a "Hot Lab"

This article dramatically takes you into the depths of the concrete subterranean vault at Dearborn, Mich., where Ford Motor Co. engineers in their physics laboratory are daringly delving into the secrets of radioisotopes as applied to practical production problems. As part of a well-established research program at Ford, the delicate deliberate type of techniques used in dealing with these dangerous radio-active elements makes fascinating reading, pages 25 to 28.

New Engines Dominate the National Boat Show

Engineering Editor H. H. Roberts describes some of the numerous new engines displayed at the 39th Show sponsored by the National Association of Engine and Boat Manufacturers held in New York City, Jan. 7-15. Organizations from 23 states and two foreign countries were represented in the 230 exhibits. For the report in full, turn to page 29.

Caterpillar's Huge Diesel Engine Plant

For the manufacture of four new Diesel engines fitting stationary power applications Caterpillar Tractor Co. has erected a new "KK" Building boasting 925,000 sq ft of floor space. How the layout of this building in a series of parallel-row self-contained units makes production and assembly operations novelly efficient is told in the article starting on page 30.

Pontiac 1949 Silver Streak Series

Introducing an entirely new line of Fisher bodies in two advance styled passenger cars mounted on a single 120-in. wheelbase chassis, Pontiac offers again, for '49, a choice of a six- or an eight-cylinder engine. Starter is solenoid operated, front suspension redesigned, front seats wider, and height lowered. Many more details are given in the account on page 34.

Kaiser-Frazer's Expanded Press Shop at Willow Run

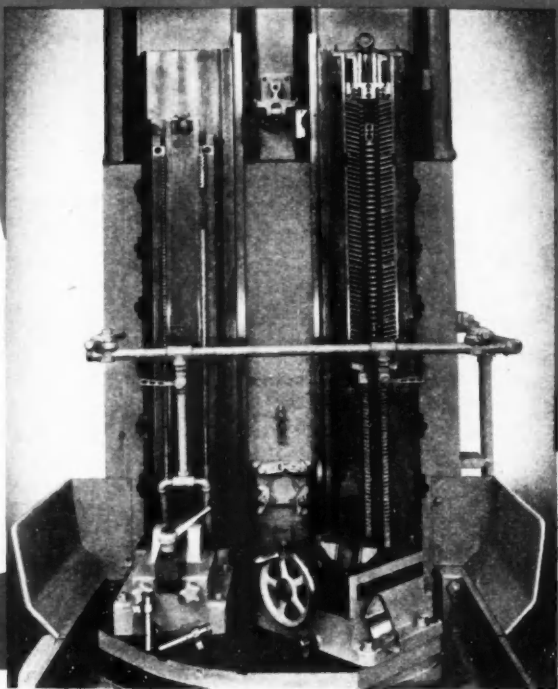
Backbone in the recently completed expansion program for streamlining production at the Kaiser-Frazer press shop is the installation of 42 latest design large presses of single-action, double-action, and triple-action type. The article explains a distinguishing K-F shop set-up for producing economical long runs on each press as contrasted to customary seasonal runs on each press. See page 43.

20 New Product Items And Other High Spots, Such As:

Selective hardening of Dynaflo transmission parts; the two wheelbases offered in 1949 Plymouth and Dodge cars; Federal's new utility truck; new bodies and mechanical improvements on 1949 Chevrolets; and the Preparedness Plans and Communism Menace as portrayed to the SAE.

*News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3*

One Ram BROACHES HALF BORES and JOINT FACES the other BROACHES T-SLOTS



Operation "small fry" occasionally falls heir to the low cost benefits derived from high production machines. The equipment illustrated here, another example of Cincinnati Application Engineering, shows what can be done. The machine, a CINCINNATI No. 10-66 Vertical Duplex Hydro-Broach, is normally considered a high production unit. Nevertheless, the low cost potential is realized with comparatively small quantities in this manner:

The right-hand broaching station is tooled up to broach a family of four main bearing caps. Joint face, bearing lock, and half bores are broached. The left-hand station is tooled up to broach T slots in the ends of pitman gear shafts.

Aside from broaching's high quality of finish and accuracy, other advantages derived from this setup are: One man and one machine handle several parts. Universal fixture and broach holder (right-hand station) reduce set-up time to a minimum. Production at each station may be independent, or if the material is the same, production in the two stations may be concurrent. CINCINNATI Hydro-Broach Machines and Cincinnati Application Engineering are a winning combination for your machining operations which are applicable to surface broaching. Our engineers are at your service. May we hear from you?



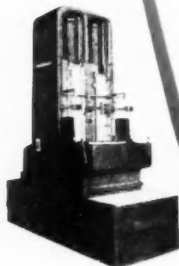
Drawing of part broached in left-hand station. Stock removal indicated in color.

Part name..... Gear pitman shaft
Material..... Steel drop forging
Operation..... Broach T slot
Stock removal..... From solid
Production..... 96 per hour



Drawing of part broached in right-hand station. Color indicates broached surface.

Part name..... Rear bearing cap
Material..... Cast iron
Operation..... Broach joint face, bearing lock and half bore
Stock removal..... 1/8" max.
Production..... 96 per hour



CINCINNATI Duplex Vertical Hydro-Broach Machine. Complete specifications may be obtained by writing for catalog M-1387-2.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
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NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 100, No. 3

February 1, 1949

K-F Shows Dealers New Utility Model

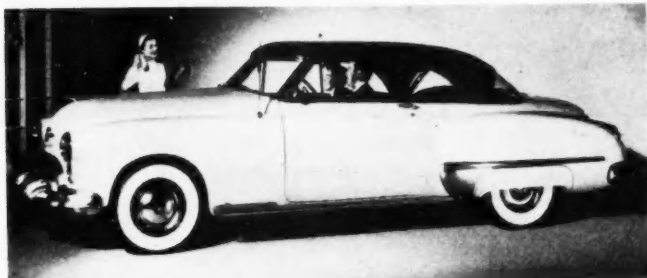
The Kaiser-Frazer Corp. has shown its dealers a new model utility car which will be available in two lines called the Traveler and the Vagabond. The cars have the basic Kaiser four-door sedan body, but are equipped with a rear seat which folds down into the floor and a novel rear end arrangement in which the trunk lid hinges from the bottom and folds down over the bumper with an upper section hinged at the top of rear window enabling it to swing upward. The result is a large opening with storage space extending from the back of the front seat to the rear of the extended lower section of the deck lid. The interior is trimmed in leather and when the seat is raised to normal position, the car has the arrangement of a conventional four-door sedan. The Traveler is the lower priced model of the line, the principal difference being in the upholstery and trim. It will be in production in late March or April. The company also showed its dealers its new Virginian, a hardtop two-seater, similar in appearance to the convertible, and also its convertible line of soft top models. A new Kaiser taxicab was also shown.

Mooney Says Competition Will Revive Merger Talk

Close observers of what goes on in the automobile industry are wondering just what significance may be imputed to a recent statement by James D. Mooney, board chairman and president of Willys-Overland. In commenting that the buyers' market has returned, he said that it "will demand increased efficiency in production and distribution. This, in turn, will induce discussions of mergers in the automotive field."

Prices of 1949 Chevrolet Up Average 7.5 Per Cent

Reflecting the \$50 million spent in changing over for production of the 1949 Chevrolet, W. F. Armstrong, GM vice president, and general manager of the Chevrolet Motor Div. has an-



HIGH-POWERED HOLIDAY

Making its debut at the GM show in New York City recently, Oldsmobile's new Holiday Coupe has a steel top, combining the styling of a convertible with the protection of a closed body model. It will be powered by Oldsmobile's new eight-cyl Rocket engine.

nounced that the prices of the new passenger car line are up an average of 7.5 per cent. The new Fleetline series prices will average 5.4 per cent higher, and the new Styleline series prices will be up an average of 8.9 per cent.

The list prices of the new Chevrolet lines by models are as follows:

Fleetline Special Two-door sedan	\$1340
Fleetline Special Four-door sedan	\$1385
Fleetline DeLuxe Two-door sedan	\$1415
Fleetline DeLuxe Four-door sedan	\$1460
Styleline Special Two-door sedan	\$1340
Styleline Special Four-door sedan	\$1385
Styleline Special Business coupe	\$1275
Styleline Special Sport coupe	\$1345
Styleline DeLuxe Two-door sedan	\$1415
Styleline DeLuxe Four-door sedan	\$1460
Styleline DeLuxe Sport coupe	\$1430
Styleline DeLuxe Convertible coupe	\$1790

Oldsmobile Steps Up Output of New Rocket Engine

GM's Oldsmobile Div. is increasing the output of its new high-compression engine at a rapid rate, S. E. Skinner, general manager of Oldsmobile and vice-president of GM, announced recently. He stated that when the "Rocket" engine was placed in production last September, Oldsmobile production men worked eagerly toward a goal of 30 an hour, and that after ironing out minor production difficulties, they found that the new plant was capable of producing 40 units a hour. Mr. Skinner stated that the use of transfer machines, which automatically move engine parts through as many as 24 stations, made this increased productivity possible. He said that all Series

88 and 98 Futuramic Oldsmobiles for 1949 will be equipped with the new "Rocket" engine.

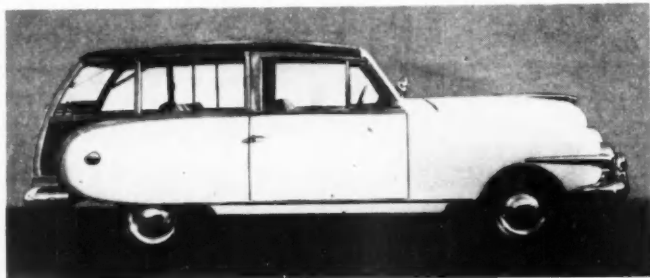
GM Production Passes Two Million in 1948

In an official year-end report, GM has announced that it built 2,147,397 cars and trucks in the U. S. and Canada last year. Passenger cars accounted for 1,631,171 units, with trucks and motor coaches totaling 510,864 and 5362 respectively. Production of motor coaches by the GMC Truck & Coach Div. was a new record for the industry, surpassing the 1947 GMC total of 5352.

Buyers' Market Questioned; Regulation W Hit

Despite all the talk about a slump in new car sales and a return to the buyers' market, it is very difficult to get a really accurate picture of what is happening because of the many confused word-of-mouth stories being passed around. Actually, the situation appears to be that there is undoubtedly not the mad scramble for automobiles that existed a few months ago, and that the used car market, without doubt, has fallen off seriously. Nonetheless, new car dealers are able to move practically all of the cars they receive from the factory.

NEWS of the AUTOMOTIVE INDUSTRIES



UTILITARIAN PLAYBOY

The Playboy Motor Car Corp's latest development is this station wagon. The mechanical units of this model are said to be similar to the previously-announced Playboy model which is powered by a four-cyl. 48-hp engine. The station wagon differing only in body, has a slightly longer wheelbase.

The situation is spotty among the various companies with Kaiser-Frazer and Willys the only two companies definitely willing to say that the buyers' market has returned. K-F puts the responsibility for slow sales directly on Regulation W, which requires a one-third down payment, and a maximum of 18 months on the balance. As a result, monthly payments are well over \$100, which the company says is depriving thousand of prospective buyers from purchasing automobiles. Other companies have been very reluctant to say that Regulation W has affected their business, but the growing consensus is that the restriction is having some effect, and will continue to be felt more in the months ahead. Used car dealers have been against the regulation right from the start, and in recent weeks new car dealers, who were apathetic at first, have become increasingly vocal, with NADA actively working toward modification. Representative Wright Patman has fired the opening gun in Congress by accusing the Federal Reserve Board of depriving millions of Americans from owning automobiles they need and want to buy. What dealers and K-F want principally is an extension of payments to 24 months or longer. There is no serious opposition to the one-third down payment requirement, since in many cases the trade-in will account for all or most of it.

Ford to Draw Foremen from Ranks in Future

The Ford Motor Co. has embarked on a new plan to develop supervisory replacements through the promotion from the ranks of hourly-rated and salaried

employees. The company has announced that henceforth the only way anyone can become a foreman or supervisor will be through such promotions as outlined in the program. A second phase of the plan is to train all present supervisory employees in overall techniques of management. The "management development program" includes training for all supervisors on company time in such fields as personnel and union relations, quality of workmanship, cost of production problems, company development and tools, machines

and materials. The qualifications for foremen trainees, who are to be selected from rank and file workers include apprentices and trade or high school graduates, are a minimum of three years' shop experience, satisfactory labor relations, attendance and conduct record and physical condition, and a statement of qualification from immediate supervisor. Trainees selected will attend, on their own time, 100 hours of training sessions on management problems and knowledge of tools, machines and equipment.

Kaiser-Frazer and Ford Reduce Production Schedule

Because of reduced ability to sell automobiles, Kaiser-Frazer has reduced its production from 675 units a day to about 400. The company says that Regulation W is solely responsible. Production will be on a one-line basis, requiring the layoff of 3500 employees, rather than by operating both lines on a curtailed work week. Edgar Kaiser, vice-president and general manager, says that the company is in the best financial position of its short history, with assets of more than \$118 million and working capital in excess of \$47 million. He said also that the company will operate profitably at the 400 daily rate, and that it might even be able to go as low as 250 a day and still break even. The reduction in schedule is said



WHEELS FOR THE BASTILLE

The Tokyo headquarters of the newly-established Japanese National Rural Police is now using this operations bus equipped with a photographic laboratory, public address system, short wave receiver, lookout tower, and searchlights. With a capacity of 20 persons, it is 24 ft long and weighs 9 tons.

NEWS of the AUTOMOTIVE INDUSTRIES

to be only temporary, and the company predicts an eventual increase this year over the 181,000 cars built in 1948. The K-F curtailment because of sales resistance marks the first such reduction in the industry by a passenger car manufacturer since the end of the war.

Ford's Lincoln-Mercury Div. is reducing production temporarily because of a materials shortage, but this year Lincoln-Mercury will build substantially more cars than last year, according to Benson Ford, general manager. The 1949 program calls for more than 225,000 units, compared with 198,390 last year. The company dipped heavily into its inventory during the last quarter of 1948, and as a result is currently scheduling approximately 10 per cent

been operated since 1930. The new company will be a direct dealer and parts wholesaler. C. H. Bliss, president, has purchased all physical assets of the branch, and will operate it with practically the same personnel of the former Chrysler Detroit Co. He has had 35 years' experience in the automobile business starting as an Oakland dealer in Flint in 1914, and has also had factory experience as a former sales manager of Nash.

Studebaker Pacific to Up Capacity

The Studebaker Pacific Corp. has announced expansion plans for its assembly plant at Los Angeles, Calif. In-

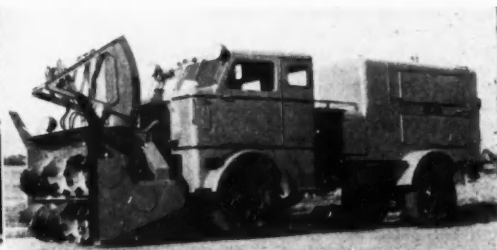
visibility of design will become an increasingly important factor in selling automobiles.

USAF Procurement Reallocated

To achieve a more effective U. S. Air Force-in-being with minimum delay, the readjustment of presently available USAF procurement funds in line with the President's Budget Message has been disclosed. The cancellation of production plans for certain aircraft will free about \$300 million which will be used for the procurement of a substantial additional number of B-36's and extensive modernization and im-



This Canadian Sicard Snow Master has a large turbine that can sling snow approximately 150 ft. it is claimed, in order to clean airports and highways. For city snow removal, as shown here in



Authenticated News

PILES IT HIGHER AND DEEPER

Montreal, Canada, a sectional chute can be connected to the Snow Master enabling it, it is said, to fill a large snow truck in about one minute.

fewer Lincolns. Materials are expected to be in ample supply to boost Mercury schedules from about the current 700 a day level to more than 760 about the first of May. Ford car and truck production is scheduled to be stepped up about the same time from 4200 units daily to 4350. Following the K-F announcement to reduce schedules, Studebaker and Nash have announced that they expect to build more cars this year than they did in 1948. GM has consistently maintained that it will build about 10 per cent more units this year than it did last year.

Chrysler Division Sells Detroit Factory Branch

In line with its announced policy of getting out of the retail automobile business, Chrysler Corp.'s Chrysler Div. has sold its factory branch, the Chrysler Detroit Co., to Bliss Motors, Inc., a new organization. The branch had

increased facilities are expected to raise its capacity to 160 units a day, according to company officials. The present rate of production is 96 units a day.

GM Model Change Held To One Week a Plant

Despite the drastic changes in body styling made by GM divisions last year, shutdown of assembly plants for 1949 models averaged only one week a plant, according to L. C. Goad, GM vice-president and general manager of the Fisher Body Div. Before the war the change-over period often required suspension of assembly plant activities from four to six weeks. Mr. Goad also took issue with the critics of current automobile styling who say that it is dangerously approaching a bottleneck of sameness. GM's plans for future cars, he said, will prove the critics to be in error. He added that as the sellers' market ends and competition again develops, indi-

provement of other B-36's and B-50's, which are now on contract. The revised plans provide for the cancellation of the final 51 of 190 North American B-45's. The production plans for the following aircraft, none of which has reached the production stage, are also being cancelled: 30 Northrop RB-49's; 118 North American F-93's (formerly known as F-86C's); 30 Northrop C-125's; and 10 Kellett H-10 helicopters.

See Canada's Car Industry Continuing Output Pace

Canada will not experience any wide-scale unemployment in its automobile industry this year, according to industry officials. "There's a market for all the cars that can be made in Canada," an officer of GM of Canada at Oshawa, said. "Canada last year produced 258,000 cars and trucks, which was within 1000 of 1947. We will do the

NEWS of the AUTOMOTIVE INDUSTRIES

same this year. The waiting list is still long."

Warren Hastings, assistant general manager of the Ontario Motor League, says that it will take a year or more before the supply is equal to the demand. Demand in Canada is extremely heavy for lower-priced cars. He said that there will be sporadic layoffs in Canada during changeovers, but that this is an usual development. The lack of steel will also be a determining factor; however, he pointed out that steel was in short supply in 1948 and despite that, total production in Canada just about equalled that of the previous year.

D. B. Greig, president of the Ford Motor Co. of Canada, voiced the opinion of others in the industry. He said that the backlog of orders is still large. Ford of Canada recently announced that 800 men were being laid off because of restrictions on exports to South Africa. Asked why these men could not be used to turn out more cars for the waiting list in Canada, Mr. Greig said that the cars produced for South Africa are vastly different to those used here. "To make a change of that nature," he said, "would involve adjustments in materials months ahead. Assembly line capacity is limited to handling cars for domestic use and these are being utilized to capacity."

GM Detroit Transmission Makes One Million Hydra-Matics

Since production began in June of 1939, GM's Detroit Transmission Div.



AIR-COOLED AGRICAT

Powered by an air-cooled Wisconsin engine developing 6 hp, the Agricat, shown above, is being produced by Earl H. Pence & Co., Inc., Berkeley, Calif. This small track-type tractor, 38 in. in width, and 41 in. in height, weighs 1170 lb.

has built more than one million Hydra-Matic drives. Prior to the organization of the division in 1939, GM's Oldsmobile Div. used a semi-automatic transmission produced by Buick. The Detroit Transmission Div. was organized and assigned to produce the Hydra-Matic unit after it had been fully tested and approved. This division turns out Hydra-Matics for Oldsmobile, Cadillac, Pontiac and GM of Canada. Since the Hydra-Matic must be tailored to fit the power-weight ratios of the cars in which they are used, the division builds

three separate transmission models. The big jump in production has come since the end of the war, with 785,000 units turned out since August of 1945. Last year production was 414,000 units, nearly half the total of the division since it was organized nine years ago. A new plant for the Detroit Transmission is now under construction near the western outskirts of Detroit. While GM is keeping very quiet about future plans for its automatic drives, Chevrolet has started tooling for a torque converter type transmission which is said to be somewhat simpler in design than Buick's Dynaflo, and which utilizes several sheet metal components instead of castings.

NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the Ten Months' Totals

MAKE	ELEVEN MONTHS									
	Units					Per Cent of Total				
	November 1948	October 1948	November 1947	1948	1947	1948	1947			
Chevrolet	60,920	60,259	50,592	650,456	576,434	20.46	20.20			
Ford	56,521	59,775	48,477	429,041	480,575	13.49	16.83			
Plymouth	35,532	34,229	21,609	313,532	282,441	9.97	9.99			
Buick	14,967	20,930	20,957	223,670	222,520	7.03	7.79			
Pontiac	19,224	18,367	16,939	208,317	185,755	6.58	6.51			
Dodge	19,155	13,343	15,976	192,710	189,116	6.06	6.82			
Oldsmobile	14,089	15,406	14,103	166,179	163,513	5.23	5.73			
Studebaker	11,833	11,206	8,883	131,901	92,104	4.15	3.23			
Mercury	14,423	15,551	11,512	125,625	97,878	3.95	3.43			
Kaiser	8,411	8,621	7,047	103,222	47,220	3.25	1.65			
Hudson	9,912	6,853	1,491	97,918	60,450	3.09	2.83			
Nash	7,452	2,110	7,612	96,613	93,913	3.04	3.26			
Chrysler	9,341	6,698	7,525	95,529	84,578	3.00	2.96			
De Soto	7,902	5,083	5,077	74,606	65,365	2.36	2.30			
Packard	6,750	4,645	4,073	70,216	42,966	2.21	1.50			
Frazier	3,831	2,774	5,831	54,862	44,835	1.72	1.54			
Cadillac	3,757	6,054	4,445	54,268	47,104	1.71	1.65			
Lincoln	3,067	3,576	2,122	29,310	21,721	.99	.76			
Crosley	1,331	1,619	1,321	24,326	14,455	.76	.51			
Willys	2,030	1,295	1,004	19,444	21,496	.61	.75			
Austin	424	562		8,314		.26				
British Ford	392	445		2,719		.09				
Playboy				58						
Tucker	1			3						
All Others	637	1,067	38	6,577	719	.21	.03			
Total	313,230	291,442	258,934	3,179,533	2,854,968	100.00	100.00			

* Data from R. L. Polk & Co.

British Leyland Names Fedden Long-Term Research Chief

Sir Roy Fedden, for more than 20 years chief engineer of the Bristol Aeroplane Co., England, has taken a position with the Leyland Automobile Co. as chief of the long-term research and development department. He will also hold a position on the board of directors. It is understood that this department will be separate from the existing research department, inaugurated just after World War I, and which will continue to be responsible for short-term projects.

Rootes Group Shows New Models in U. S.

The Rootes Group of Great Britain has shown in its new model Hillman

NEWS of the AUTOMOTIVE INDUSTRIES

Minx and Sunbeam-Talbot motor cars in New York. The company is establishing dealers and service centers in large cities in this country preparatory to marketing its products here, and hopes to sell 10,000 or more cars in the U. S. this year. The Hillman Minx is a four-cyl car, slightly smaller than the average U. S. counterpart, and will probably sell for \$1,900. The Sunbeam-Talbot is a luxury car in about the \$3,400 price range.

Ford Employee Turnover Continues to Decline

Ford continues to report improvement in its employee relations as indicated by labor turnover records. The figures for 1948 show a reduction for the third straight year in the rate of labor turnover for hourly personnel at the Rouge plant in 1948 to 1.9 per cent a month, compared with 2.1 per cent in 1947 and 2.7 per cent in 1946. The figures are based upon separations and exclude permanent layoffs. Including permanent layoffs the rate last year was 2.4 up to Dec. 1, compared with 5.4 for the automobile industry as a whole for the first nine months of 1948, and 4.6 for all manufacturing industry.

Hamby New Works Manager of Dodge Stamping Plant

Otis T. Hamby, formerly general master mechanic at the Dodge plant, has been appointed general works manager at Dodge's new Nine Mile press plant in Detroit. According to L. L. Colbert, Dodge president, the new press plant, located adjacent to the Dodge Truck plant, will be used for production stampings for cars and trucks, and to meet increasing requirements for sheet metal service parts. It has an area of 413,000 sq ft under one roof, and includes a die room, storage area and receiving and shipping docks. The plant was started about a year ago.

Chrysler Dividend Rate Increased to \$1.25

The Chrysler Corp. has announced a stock dividend of \$1.25 a share on capital stock to stockholders of record Feb. 14. The dividend rate is an increase of 25 cents a share from the previous rate. Since the stock was split two-for-one in July, 1947, Chrysler has been paying \$1 a share quarterly. During the first half of 1947, before the stock split, the payment was \$2.25 a share.

Delivered Price Confusion May be Cleared Soon

The outlook is brighter for action to clarify the present confusion regarding the legality of delivered pricing methods. Legislation to permit delivered pricing and the absorption of freight in good faith to meet competition has been introduced in both Houses of Congress. Congressional interest in the problem has been aroused and the prospects for eventual action are good.

It is also possible that a clarification may come from the Supreme Court before Congress acts. The Court, which started all this controversy with the now famous Cement Decision, will soon have an opportunity to tell industry whether the widely-accepted interpretation of that decision is correct, in other words, has all freight absorption been outlawed?

This opportunity arises out of the Rigid Conduit case, in which the Circuit Court upheld a Federal Trade Commission order which in two separate counts found the Rigid Conduit industry guilty of using a basing point system and absorbing freight. The industry was adjudged guilty if use of this method of pricing was on an individual basis and, in another count, as part of a conspiracy.

It is this conflict that the Supreme Court has been asked to resolve and it is most unlikely that the case will not be heard. If the Court's decision results in amending the FTC order so that freight absorption is illegal only as part of a conspiracy, and the Pittsburgh Plus order is also amended permitting U. S. Steel to absorb freight, certain FTC officials feel that the whole delivered pricing mess will evaporate

overnight. There would be no need for legislation or further investigation by Congress, according to these sources.

Change Oil for Govt. Vehicles at 4000 Miles

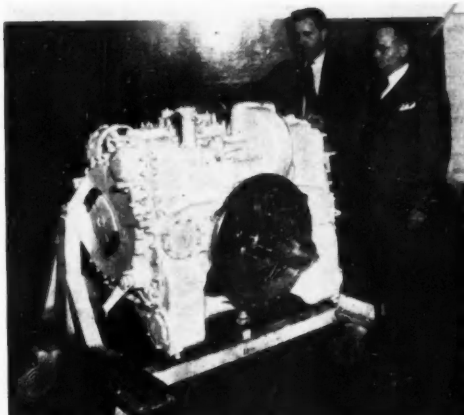
Oil in the engines of government passenger cars, trucks and buses will be changed only in the spring and fall, or every 4000 mi, whichever comes first, under the terms of a recommendation issued by the Bureau of Federal Supply, the government's central purchasing agency. The previous recommendation was an oil change at 6000 miles. The new recommendation was issued only after exhaustive tests by the Technical Committees on Lubricants and Liquid Fuels showed that "under normal driving conditions and controlled preventive maintenance, oil changes of less than 4000 mi are unnecessary."

Munitions Board Predicts No Upset from Arms Plan

One big question in the minds of automobile industry leaders has been what effect the defense program will have on the civilian economy this year. At the SAE meeting in Detroit, this was partially answered by Lt. Gen. LeRoy Lutes, director of staff for the Munitions Board, who said that the effect this year will probably be about the same as it was in 1948. He pointed out that the only sizable procurement program is in the aircraft industry amounting to about \$2.5 billion. He said that only a small part of the balance of the \$15 billion program for this year will be allowed for procurement, and that

TRANSMISSION FOR TANKS

GM's Allison Div. has been awarded a contract by the Cincinnati Ordnance district to build this new CD-850 mechanical-hydraulic torque converter type transmission for the M46 General Patton tank. Including tooling, the order's value is estimated at \$40 million. The new transmission weighs 3000 lb. and is used with an 850-hp engine. Chief designers of the CD-850 are, at left, J. E. Storer, chief ordnance engineer, and right, R. E. Lynch, manager of the Transmission Engineering Dept. of Allison.



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the major part will be for maintenance of the military establishment both at home and in occupied countries. He said that about 77,000 surplus tools have been withdrawn from surplus stocks and are now in storage, and that 44,000 more have been tagged for the reserve and now are being acquired for the Armed Services. The Munitions Board is authorized to increase the reserve to a total of 182,000 items. Congress has authorized 30,000 items of metalworking tools and other equipment of which 6700 have been selected

Ford Plant Visitors Total Quarter Million

The Ford plant at Dearborn, Mich., continues to be a major attraction for visitors to the automobile industry. Last year nearly 222,000 persons visited the plant, with the number about equally divided between visitors who toured the plant and those who called for business reasons. They represented every state in the union, most of the U. S. territories and possessions, and 72 foreign countries.

ever, independent repair shops may purchase exchange shoes from a wholesaling Chevrolet dealer, take shoes to their jobber for exchange, or relining if he is so equipped, or may do the job themselves.

Philippines Puts Controls on Automotive Imports

The Philippine government has placed the importation of automobiles and other items under controls to conserve



Authenticated News

THREE ON THREE

Still another product of the People's Autosalon, held in Prague, Czechoslovakia, is this tricycle automobile which features a two-cyl engine located in the rear. With a top speed of ap-

proximately 50 mph, this car is about 122 in. in length, 61 in. in width, and weighs 639 lb. The designer, V. Krejchich, is shown in his tricycle car which seats three.

and 2000 have already been shipped.

Lt. Gen. Lutes pointed out that since standby reserve plants and those sold or leased under the security clause are inadequate for a full war effort, and will provide only a running start, private industrial plants would again have to bear the brunt of an all-out military effort production. He said that about 90 per cent of the productive capacity of this country covering 22,000 to 25,000 plants is being surveyed. The Armed Forces have made 27,000 separate requests for tentative allocations of private industrial capacity of which 21,000 have been approved by the Munitions Board. He said that nearly 83 per cent of the funds made available for the 1949 fiscal year have been already spent or obligated and that stocks and commitments are badly out of balance. He also revealed that 16 engineering standards are under study and that the Board believes specifications can be reduced from 12,000 to less than 8000. Projects include standardization of aircraft equipment, and automotive and industrial and marine engines.

MacKay Made Director of K-F Purchasing

The Kaiser-Frazer Corp. has named L. S. MacKay as director of purchases. He was formerly assistant director of purchases, and in his new position succeeds Fred Lord.

Chevrolet Using Bonded Brakes on 1949 Line

GM's Chevrolet Motor Div. is using bonded brake linings 100 per cent on its 1949 passenger cars. Crosley adopted bonded brakes last year, and the Chrysler lines will have them on new models. Chevrolet has been using the bonded linings for several months on some of its lighter trucks, as has Dodge. In order to provide service, Chevrolet will supply dealers with exchange shoes from the factory, or if they have their own bonding equipment, they can do the job themselves. The factory has not approved any particular type or make of bonding equipment for dealers. How-

dollars and protect local industries. The items on the restricted list can now be imported only by importers registered with the import control board and with the Philippine Security and Exchange Commission or Bureau of Commerce. Quotas will be set on a quarterly, semi-annual, or annual basis and will establish the quantity or value of items which may be imported under licenses. The order was effective Jan. 1. No information is available as to what automobile quotas will be under the new order, but percentage cuts in all items vary from 20 per cent to 95 per cent, with most in the 40 to 60 per cent bracket.

Price of Steel Scrap Declines \$2 Per Ton

There have been some heartening developments in the steel scrap market during recent weeks. Early in January, steel companies were able to buy dealer scrap at \$2 a ton less than the previous price, and they also affected savings by

NEWS of the AUTOMOTIVE INDUSTRIES

WATCH ITS SMOKE

This GM Fisher Body Div. engineer is applying a smoke test to a 1949 model automobile to determine if there is an air leak. The machine at the upper left creates a vacuum inside the car, and the engineer then passes the smoke torch around the door and window openings.



eliminating partial payment of freight charges on the scrap amounting to as much as \$2.50 a ton. While the price reduction is not large, it is a significant factor indicating that the supply is much more plentiful than it was a few months ago.

ECA Expects Decline In Steel for Europe

Steel going to the European Recovery Program this year should not be any more than was taken last year, and there are definite hopes that it will be less, according to Paul G. Hoffman, ECA Administrator. At a press conference in Detroit he said that the total last year was 5.5 to 6 million tons which is the same historical percentage of total output that prevailed in prewar years. He said that European steel production is up 27 per cent, and the prospects are that it will be increased even more this year, which will help relieve the demand for steel from this country. To promote that end, ECA is giving any reasonable help possible to expand steel producing facilities in Europe.

Opinion Divided on Timing of Automobile Show

Not only is there some division of opinion as to whether a national automobile show should be held later this year or early in 1950, but there is also some question as to whether it should be held in the spring or in the fall. One school of thought holds that the show should be held during the fall or early winter months when sales are normally slow in order to stimulate the market. Another line of reasoning is that the show should be held in the spring when buyers are in the market

and are receptive to new models. At any rate, there is no definite action yet on when or where such a show will be held.

Glenn Martin Names Hovgard As Flying Boat Project Engineer

A former aviation executive in Buffalo, Paul E. Hovgard, has been named project engineer for all current flying boat projects of the Glenn L. Martin Co. in Baltimore. Mr. Hovgard at one time was director of flight tests for the Airplane Div. of Curtiss-Wright, and was later associate director of the Cornell Aeronautical Laboratory in Buffalo.

Chevrolet Tooling Cost Close to \$50 Million

The cost of tooling for the 1949 model Chevrolet was about \$50 million, according to T. H. Keating, general sales manager, who stated that before the war the cost of bringing out a new model was about \$15 million. He revealed that at the end of last year, the company had on its books 100,000 more unfilled orders than at the beginning of 1948, but that the truck order backlog during the same period declined about 80,000. Although the large backlog of orders would indicate a sellers' market through the year, Mr. Keating pointed out that when orders begin to drop off they melt a great deal faster than they accumulate.

Name Swigert Vice-President of Universal Products

Arthur M. Swigert, who was master mechanic at the Chrysler Tank Arsenal during the war, has been appointed vice-president in charge of all manufacturing operations of Universal Products, Inc. He is the author of a handbook on metal finish called *Super Finish*.

Prices of 1949 Pontiacs Up \$40 to \$135

The factory list prices of the new 1949 Pontiacs have been boosted from

NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the Eleven Months' Totals

MAKE	ELEVEN MONTHS					
	November 1948	October 1948	November 1947	Units 1948	Units 1947	Per Cent of Total
Chevrolet	23,694	25,302	24,518	278,417	207,670	28.95
Ford	14,125	17,641	10,945	213,358	181,827	22.11
International	7,654	9,211	9,028	118,258	104,650	12.28
Dodge	8,682	9,869	10,221	106,012	118,481	14.65
G. M. C.	6,764	7,448	4,525	68,959	44,640	7.15
Studebaker	4,358	4,258	3,458	46,370	38,393	4.81
Willys Jeep	2,682	3,408	4,076	46,243	44,015	4.79
Autocar	2,384	2,374	760	29,373	1,308	2.83
White	981	822	1,074	10,839	12,084	1.13
Reo	580	571	1,026	10,153	11,952	1.08
Diamond T	707	760	915	10,063	9,769	1.04
Mack	546	820	961	9,205	10,106	.95
Divco	319	513	404	5,367	4,522	.56
Federal	223	230	352	3,911	5,537	.41
Brockway	270	226	319	2,781	3,920	.29
Hudson	254	232	285	2,560	4,038	.27
Crosley	153	135		2,302		.24
F. W. D.	61	37	118	788	1,116	.08
Kenworth	49	47		420		.04
Sterling	15	31	47	367	545	.04
Ward La France	14	15	33	262	474	.03
Oshkosh	10	12	23	160	222	.02
Nash	3	1	24	116	2,514	.01
All Others	303	280	405	2,449	3,747	.25
Total	75,024	84,284	73,737	964,892	911,442	100.00

* Data from R. L. Polk & Co.

NEWS of the AUTOMOTIVE INDUSTRIES

\$40 to \$135. The Torpedo series has been discontinued for 1949, and the 1949 models include the Streamliner series and a new Chieftain series.

The prices of the new 1949 Pontiac models advertised delivered at Pontiac, Mich., are as follows:

STREAMLINER		Six	Eight
Sedan coupe		\$1721	\$1789
Four-door sedan		1771	1839
CHIEFTAIN			
Four-door sedan		1792	1861
Two-door sedan		1742	1810
Sedan coupe		1742	1810
Business coupe		1618	1685
Convertible coupe		2198	2217

Buick Plans to Break Output Record in 1949

With good prospects that materials will be available in sufficient quantities, Buick's general manager, Ivan L. Wiles, asserted that during 1949 Buick plans to exceed its previous all-time production record of 316,250 cars built during the 1941 calendar year. Mr. Wiles disclosed that Buick's 1948 output of 275,504 units was the company's third largest calendar year volume, and its best production year since the war. Buick's expanded postwar capacity is more than 500,000 cars a year.



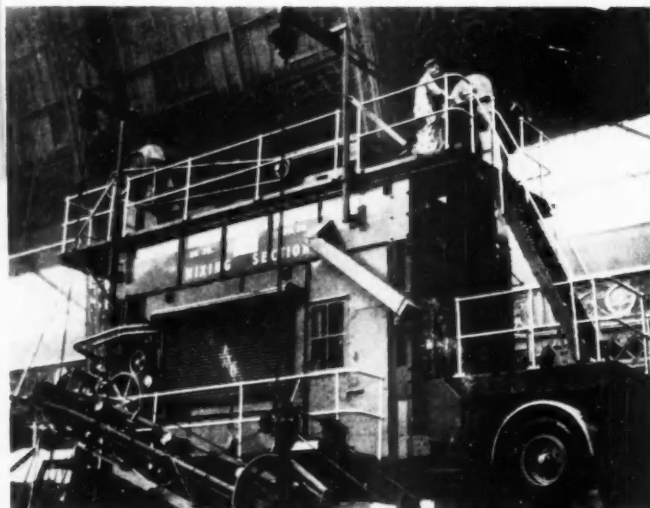
MIDGET FROM BIZONIA

Made in the British Zone of Germany, this new European midget automobile, the VW, is being shown by Bernardus M. Pan, of Pan's Automobielhandel, Holland (left), to John Van Ryn, New York, who imported it recently. Powered by an engine developing 25 hp the car weighs 1260 lb.

Nealon Resigns as Sales Mgr. of Auto-Lite Merchandising Div.

F. A. Nealon has resigned as sales manager of Electric Auto-Lite Co.'s

Merchandising Div. He joined the company in 1932, and was instrumental in Auto-Lite's successful entry into the spark plug field. He made no announcement of his future plans, but is expected to do so shortly.



THE BIGGEST AT THE LARGEST

The Public Health and Municipal Engineering Congress and Exhibition, which was held recently in London, featured what was reportedly the largest collection of contractors' equipment under one roof. Said to be the largest exhibit shown, this 90-ft long, 50-ton mobile asphalt and tarmacadam unit, produces 20 to 25 tons of road material an hour.

GE Gives Jet Part Order to Ryan and Solar

Ryan Aeronautical Co.'s Metal Products Div. has received a multi-million dollar volume production order from the General Electric Co. for exhaust cones, burner assemblies, combustion chambers and other specialized jet engine parts. The Ryan-built jet engine components have been ordered by GE for their J-47 (TG-190) model, which is going into mass production.

Solar Aircraft Co. has also been given a contract by GE to manufacture tail cones, transition liners, combustion chamber liners, aft frames, and combustion chambers for the J-47.

NSPA Names Kennedy as Field Secretary

The National Standard Parts Association has appointed William T. Kennedy as field secretary. J. L. Wiggins, NSPA executive vice-president, announced recently. Mr. Kennedy was associated with the automotive division of the War Production Board from July, 1942, until Dec., 1945, and the War Assets Administration for a year and a half following the war.

Underground in a "Hot Lab"

IN AN underground concrete vault, located on the banks of the Rouge River in Dearborn, Mich., the applied physics laboratory "hot lab" of the Ford Motor Co. now has a well-established research program under way encompassing experimental investigation into practical applications of atomic science to production problems. There engineers are investigating possible uses of radioisotopes in material processing, radiography and instrumentation. On this page and the following three pages are illustrated some of the specialized equipment, techniques and tests employed in this exploratory work. Safe handling of these powerful radioactive materials is one of the major problems, necessitating that the operator be at a safe distance from them as well as to have barriers of lead or concrete between him and the radioisotopes. In some instances, the barriers are not shown in these pictures. In the photograph on this page a Ford technician is shown manipulating an ingenious remote-controlled device that is used to screw a threaded cap on a small aluminum can when it contains an isotope.



(Below)

A function of the laboratory is to determine the actual activity and quality of radiation of specific samples. This photograph shows the setup for this procedure with Geiger counter equipment. A General Radio Corp. frequency meter is being adjusted for checking the isotope activity. Additional lead barriers, which would be used in the actual tests, are not shown in the photograph.

(Above) A search is being made here for possible defects in a heavy casting at critical sections by exposing X-ray film to rays of Cobalt 60. A capsule of it is being drawn to the section for exposure, which will take from one-half to two hours. The investigation is conducted inside brick-lined, locked vault to eliminate possible hazard to personnel.

(Top Facing Page) Ford engineers report that Cobalt 60 with a half-life of 5.3 years is an excellent isotope for radiographic inspection of metals. A six-hour exposure of type A, X-ray film to gamma rays of one unit of Cobalt was sufficient to produce this satisfactory image of a cylinder head section. Cobalt 60 is comparable in its penetrating power to a two-million volt X-ray machine. Another important use is the periodic testing of welds.





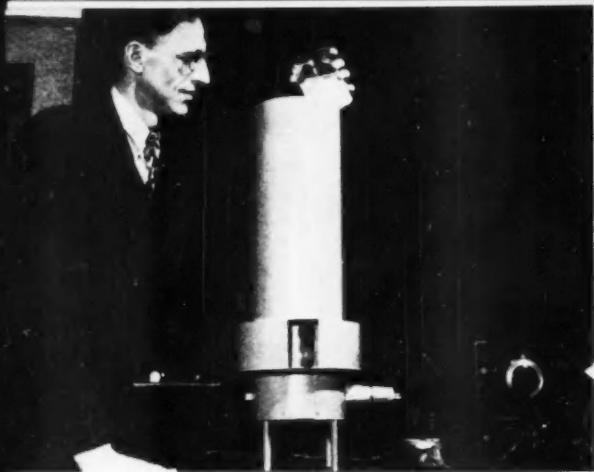
Underground In a "Hot Lab"



(Left) Adjustment is being made to the equipment that has been set up for transferring Cobalt 60 from Oak Ridge container to aluminum capsule.

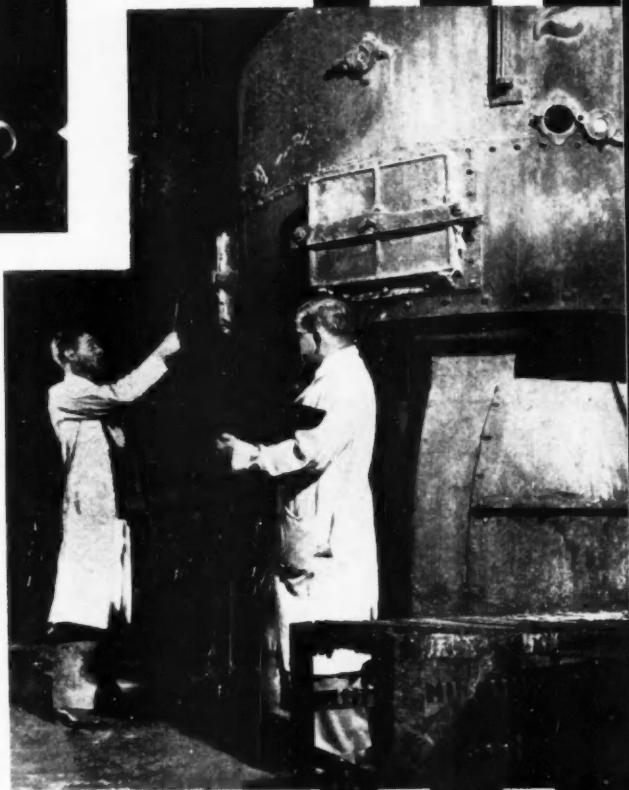
(Below) Protected by lead shields and aided by two mirrors, Ford engineer with long-handled tongs is pouring Cobalt 60 from a small beaker into aluminum capsule. A Geiger counter meter is being used to check on safety of the operation.



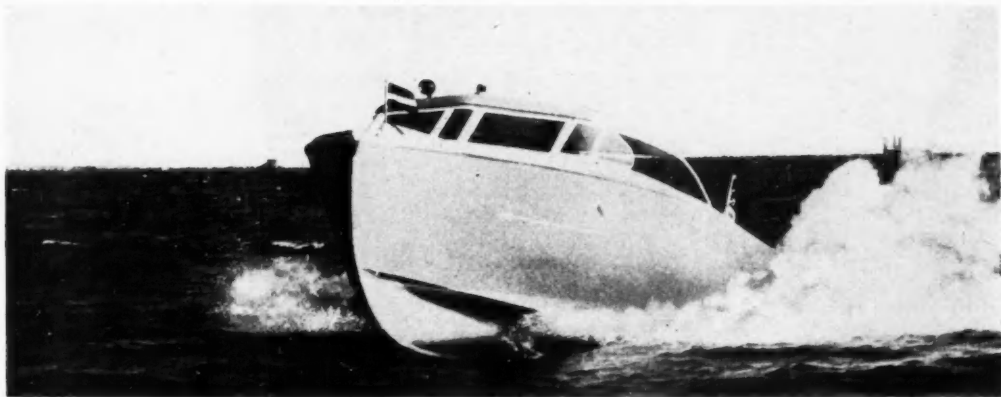


In connection with the development of automatic permanently-mounted equipment to determine the height of liquid metal in cupolas, the intensity of gamma rays passing through this foundry cupola is being measured for that purpose with radioactive Cobalt 60 inside a box placed against the opposite side of the cupola. The view above shows Dan M. McCutcheon, head of Ford applied physics research pouring water into a cupola model equipped with an experimental liquid-level height gage utilizing the radioactive isotope. Selenium 75, a minute amount of which in a capsule is held in the small bracket on the lower left side of the model with a Geiger counter detector mounted on the opposite side. Lights in the box (left) switch from red to white when the water level reaches a specified height. A pilot model of this radioactive height gage using Cobalt 60 as the source of radiation is being tested on a cupola in the Ford production foundry. Consideration also is being given to developing equipment using a beta-radiating isotope to control sheet steel thickness in continuous production rolling.

Underground In a "Hot Lab"



First pile-produced isotope ever shipped by truck from the Oak Ridge laboratory is being received at the Ford plant. In this 50-lb lead-lined sealed container are 20 grams of Selenium 75, which has a half-life of 120 days and a voltage equivalent of a 250-kilovolt X-ray machine. Even after the long trip, a check with the portable radiation meter shows that radiation from the container is negligible.



New Engines Dominate the National Boat Show

By H. H. Roberts

THIS year's National Boat Show, 39th in the series sponsored by the National Association of Engine and Boat Manufacturers in New York City, Jan. 7-15, again displayed its usual full line of boats, engines, and equipment and accessories of all kinds. Organizations from 23 states and two foreign countries were represented in the 230 exhibits.

The recreational boat industry appears to have caught up with its tremendous backlog of orders and show visitors found that most of the items shown could be purchased for early delivery.

Thirty-four manufacturers of marine engines had exhibits that ranged from power plants for large ships down to a 1½-hp outboard motor. It is apparent that advances in the use of lightweight, high-strength alloys have enabled manufacturers to further reduce weight in proportion to horsepower. Synthetic rubber water pump rotors were found on an increasing number of engines to reduce the possibility of damage due to abrasion or corrosion.

Among the new inboard engines shown was a Buda 100 hp supercharged eight cylinder Diesel equipped with a two-to-one Western Marine gear. Two Caterpillar engines were displayed for the first time. One was the Model D-397, a marine Diesel with a continuous output of 400 hp at a governed full-load speed of 1200 rpm. This V-type, 12-cyl engine has a piston displacement of 2493 cu in. Caterpillar's D-364 is a V-type eight cylinder engine developing 220 hp at a governed speed of 1200 rpm. A new version of its multiple engine arrangement was exhibited by the

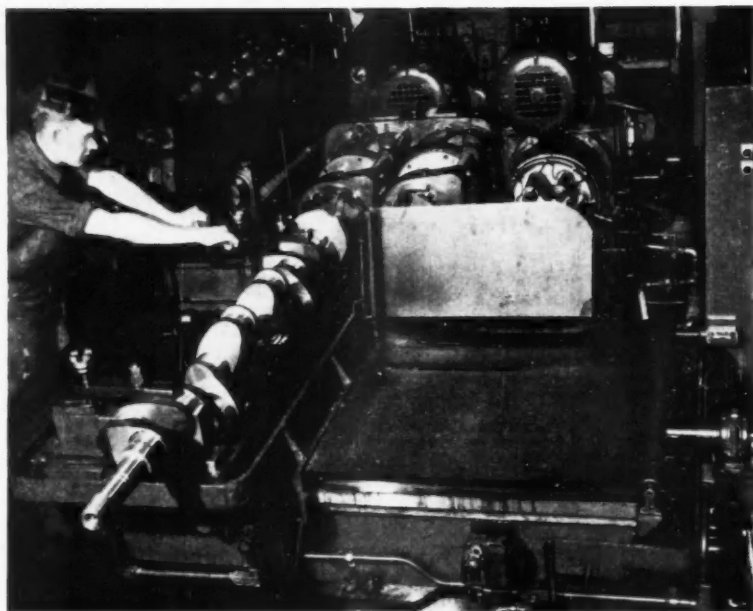
Detroit Diesel Engine Division of General Motors Corp. The 400-hp twin-six Diesel unit in tandem was designed for boats of narrow beam and measured only 37½ in. in overall width. The two six-cylinder GM Series 71 Diesels are mounted back-to-back on a channel beam base with both driving a common gear through a pinion splined to the drive shaft. Each unit is equipped with its own GM hydraulically-operated reverse gears which are operated in unison by a selector valve. The tandem twin is available with five different gear ratios ranging from 1.75:1 to 6:1.

A small British-made, lightweight, high-speed Coventry Diesel engine appeared for the first time in the United States. It is available in two sizes; Model WD-1 which produces from five to seven hp and Model WD-2 with an output of seven to nine hp. The unit is the lightest Diesel on display. Weight of the Model WD-1 is only 220 lb while the WD-2 model weighs 240 lb.

Among the 21 Gray engines was a Super Six-427 with 55 cu in. more piston displacement than the 372-cu in. eight which Gray previously built. It is rated at 175 hp at 3200 rpm. For the first time since the war, magneto ignition is again available on Gray four-cylinder marine engines.

Kermath presented a two-cylinder version of its single-cylinder water-cooled unit which was introduced last year. Known as the 2-34, it follows the lines of the original single and is rated at 10 hp at 3200 rpm.

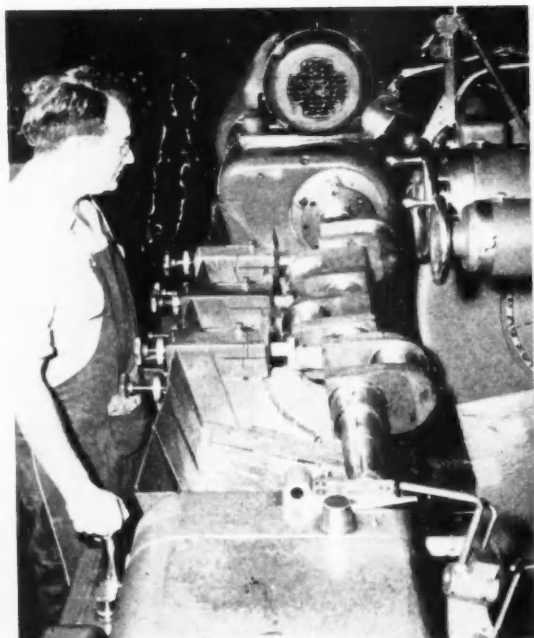
Owens Yacht Co. had on exhibit a new Flagship light
(Turn to page 74, please)



By
Joseph
Geschelin

Crankshaft flanges are drilled, reamed, tapped, etc., in this special W.F. & John Barns machine fitted with three heads and a massive fixture arranged to index accurately for each position.

Caterpillar's Huge Diesel



COINCIDENT with the recent announcement of four new Diesel engines for stationary power applications, Caterpillar Tractor Co., Peoria, Ill., recently placed in operation a new plant—the "K-K" Building—erected and equipped expressly for the manufacture of its current line of Diesel engines. Boasting a floor space of 925,000 sq ft, of which 425,000 sq ft is devoted to machine shops, the plant is modern in construction with a high ceiling and is provided with a forced feed system of fresh filtered air to promote clean, comfortable working conditions.

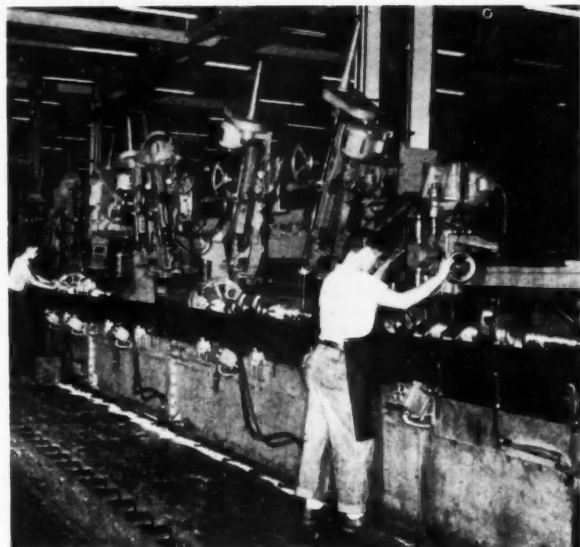
Another interesting feature of the building is a well designed system of overhead fluorescent light sources which gives an illumination of 30 foot-candles at the working level.

Fortunately from the standpoint of plant management the "K-K" operation was visualized from scratch for a specific floor plan in keeping with the philosophy established for producing the given number of large Diesel

Here is a close-up of the work station of the big Norton grinder used for finish-grinding intermediate bearing journals.

engines. Having established the desired floor plan, it was then possible to design the building around it. This method of approach is ideal from the standpoint of the manufacturing department since it avoids the compromises in layout usually necessary if the floor plan must be made to fit the building.

So far as layout and methods and equipment are concerned, the planning took into account the variety of engines to be built in regular production as well as the fact that big engines are built in lots rather than continuously in large volume. Consequently, the machine tools in the main are of the latest types that the market affords, selected for their flexibility and freedom of change-over not only to suit the current line of engines but in anticipation of future design changes. From this standpoint the operation is one of the most advanced facilities for making big engines to be found in the industry.

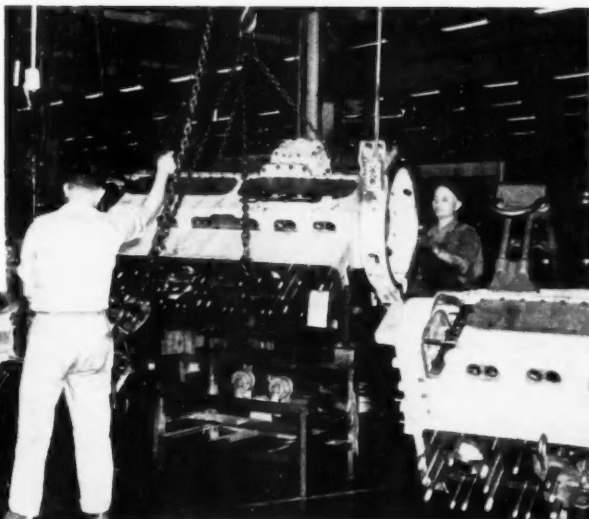


(Above) One of the two lines for drilling crankshaft oil holes. The unit shown here has five stations and ten Leland-Gifford sensitive drilling units. Work is moved progressively from station to station on a power driven transfer line.

Engine Plant

*New K-K Building has 925,-
000 Sq Ft of Floor Space
with Three Final Assembly
Lines and Engine Block Test-
ing Section Completely Sep-
arated from Manufacturing
Area by Solid Wall*

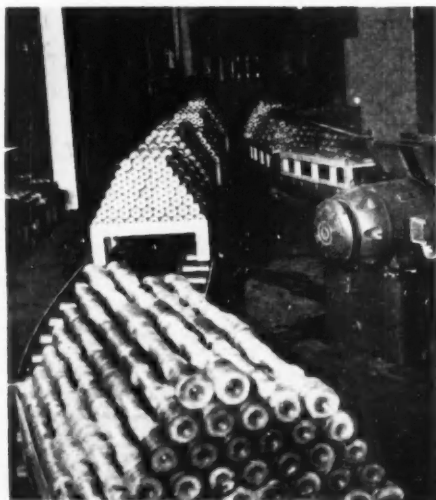
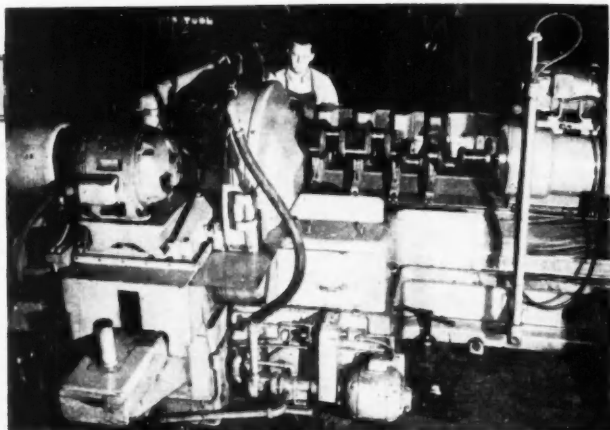
(Below) Engine assembly takes place on flush-floor-type power driven conveyor lines in two major stages. This view on the big-bore engine line is taken at the junction of the two stages. Assembly starts at the extreme right with engine placed on the stand—which may be seen in the center—in inclined position with panrail up. At the point shown here the sub-assembly is hoisted off the stand and transferred to the smaller stands—in the background—for final assembly in normal position.





(Right) Among the large crankshaft grinders in this plant is this long bed Landis grinder set up for finish-grinding of main bearing journals.

(Below) As an example of the ingenious application of heavy duty Mathews gravity roller conveyors, this view is taken in the camshaft department. A variety of arrangements of conveyors is found in every unit of the plant.



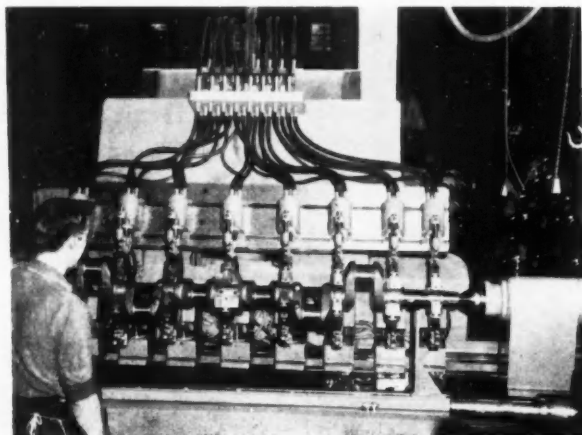
The plant has been divided into a series of self-contained units running in parallel rows, each one equipped for the complete processing of major parts of the engine such as — crankshafts, cylinder blocks, cylinder heads, connecting rods, pistons, liners, etc. Raw materials are fed in at one end and all operations for each of the lines start at this end. With this arrangement finished parts of the engine wind up at one major bay in the heart of the building within easy reach of the engine assembly lines.

When it comes to engine assembly Caterpillar has created an innovation of more than passing interest. The entire floor area occupied by the three major final assembly lines, engine block testing, and industrial engine erection, is completely isolated from the manufacturing area by a solid wall. Except for proximity the assembly area is a separate plant to all intents and purposes, insulated from the activity and effects of metal cutting.

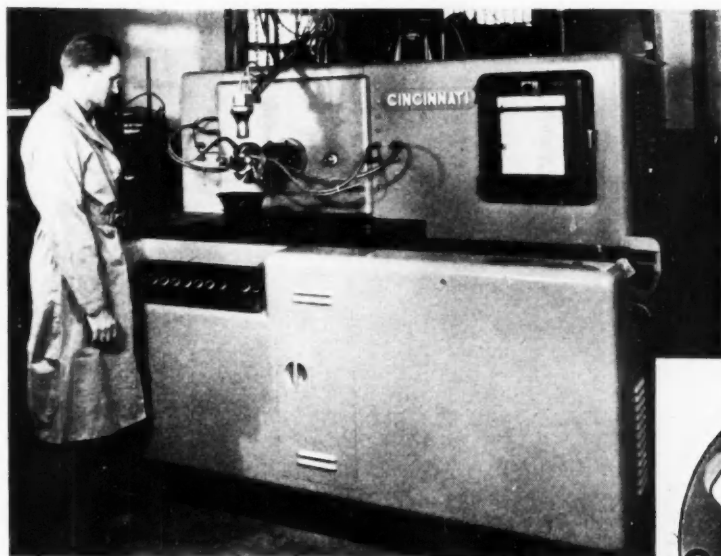
Examining the machine shop layout more closely, it is found that most units are composed of two parallel lines of similar equipment—one line tooled for large bore engines, the other for smaller bores. Since the line of Diesels made here consists of a family of engines with similar bores, it is possible to schedule engine production in economic lots through each unit. By this device it is practical to run parts for two different engines at a time, although in the case of some parts even a wider range of engines may be accommodated.

The wisdom of confining machine tools to items of general-purpose or unit type becomes evident in view of the general

(Turn to page 80, please)



This is the new eight-head Gisholt Superfinish machine with hydraulic loading mechanism for crankshaft pins and bearing journals.



Cincinnati Flamatic hardening machine equipped for selective hardening of 187 clutch cams per hour.

This illustration of the clutch cam shows the uniform heat pattern on its six lobes.



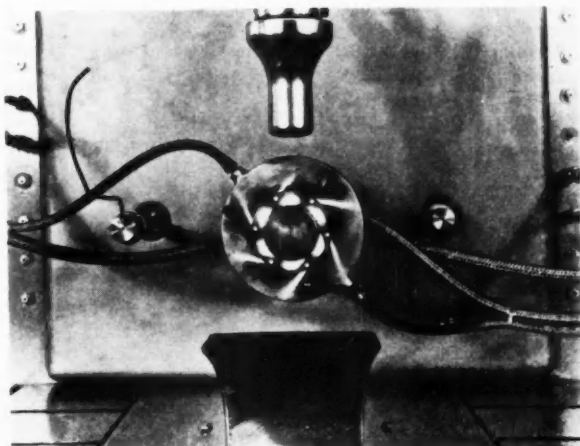
Selective Hardening of Dynaflow Transmission Parts

THE overrunning clutch cams employed on the primary and secondary stators and on the secondary pump of the Buick Dynaflow transmission are surface hardened on a Flamatic selective surface hardening machine; a standard product of the Cincinnati Milling Machine Co. which is provided with special fixtures and flame heads engineered for this specific job. The six internal cam lobes of each workpiece are hardened in a single operation at a production rate of 187 pieces per hour. The cam, of through-hardening steel, is $3\frac{3}{8}$ in. OD by $\frac{1}{2}$ in. wide. Heating time is nine seconds. Two noteworthy features of this operation are the uniformity of results and the negligible distortion. No corrective operations are required to bring the dimensions of the part back to permitted tolerances.

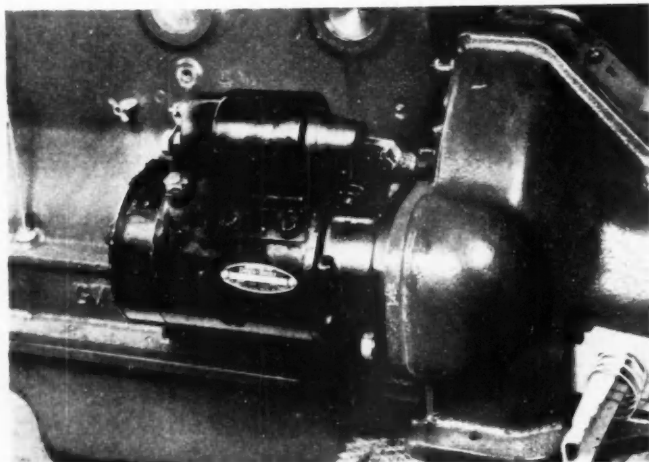
In general, workpieces are rotated dur-

ing Flamatic selective hardening, but because of the special requirements for this particular operation the piece is held stationary, mounted in a combination spindle and flame head. This water-cooled burner has six series of gas ports from which the flames impinge

(Turn to page 82, please)



Close-up view of the water-cooled burner with a workpiece in position for heating. When the desired temperature is reached, it will be dropped into the quenching fluid. Except for loading, operation is automatic.



View of new solenoid starting arrangement.

View of the standard 1949 Pontiac chassis.

Pontiac Introduces

WITH the introduction of an entirely new line of Fisher bodies for 1949, Pontiac offers two lines of advance styled passenger cars mounted on a single 120-in. wheelbase chassis. As in previous years the buyer has the option of either the six- or eight-cylinder engine. Although the major mechanical units such as engines, rear axle, and transmission remain unchanged in specification details, the '49 line bristles with important and interesting mechanical improvements.

The Hydra-Matic transmission, offered last year, is continued as optional equipment on all models. In this connection it is of interest to find that the propeller shaft is interchangeable for both synchromesh and Hydra-Matic transmissions through use of a suitable extension on the standard transmission.

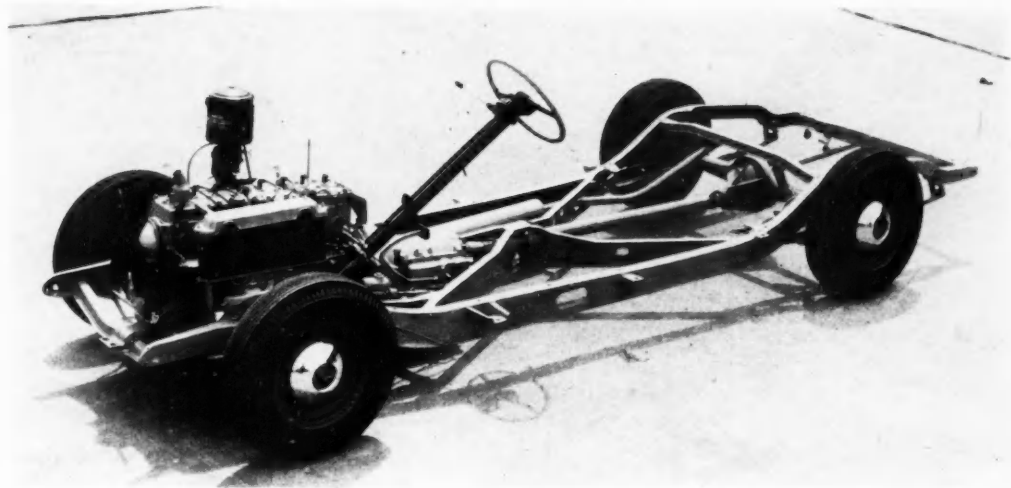
Identified generally as the Silver Streak Series 1949,

Pontiac offers a wide variety of styles in the two lines, in each case supplying them either in standard or deluxe models. As will be noted in the illustrations, the Chieftain Series has the so-called "notch" back or trunk back bodies, while the Streamliner Series is of the so-called dynamic or "fast" back type.

From the standpoint of safety and comfort, it is important to note an increase in visibility both front and rear through use of a windshield 5½ in. wider than previously and rear window eight in. wider. In addition, side vision at the front is materially improved through use of more slender pillars. An added feature is the safety roll forming the upper edge of the front seat back cushion.

Streamliner series 4-door, 5-passenger sedan.





1949 Silver Streak Series

New Fisher Bodies, Advanced Styling,

Redesigned Front Suspension, Solenoid-

Operated Starter, Wider Front Seats

on All Models, and Lower Height Are

Among New Features

Touching only briefly on styling features, it is of interest that overall length is decreased by two in. while roof height is lower by 2½ in. Moreover, the front seats on all models are 2½ in. wider. To conserve steel the rear fender is now a part of the rear quarter panel stamping and, consequently, is no longer removable from the panel.

Leading the improvement in mechanical features are the elements contributing to better handling and better, softer ride. First of these is the forward shifting of the powerplant together with positioning of the rear seat ahead of the rear axle and forward of the wheel house. This is accompanied by the use of softer front and rear suspension springs and zigzag cushion springs in seats and seat backs.

Next feature is the adoption of a new frame, described as of box girder type with four-way cantilever

cross member bracing. Because the engine and radiator are moved forward, an extra radiator support cross member has been added. It is claimed that the new frame has greater torsional rigidity.

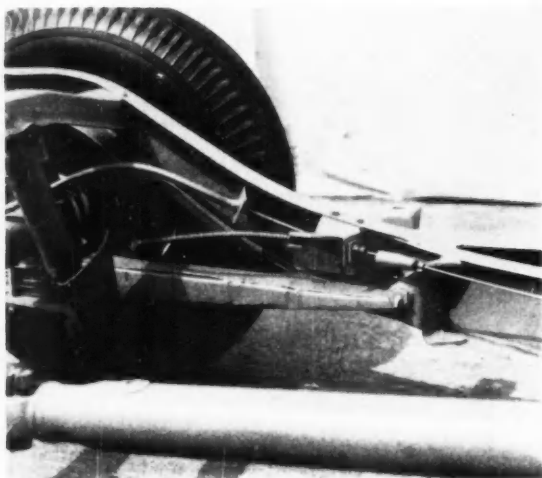
Another feature is the adoption of new extra low pressure tires as standard equipment. This is the 7.10-15 in. tire of latest type mounted on 5½-in. rims.

A new upper suspension arm and shock absorber are used in 1949. The integral upper arm and shock absorber are replaced by a separate upper arm having its own pivot shaft mounted to the frame bracket and a separate direct-acting shock absorber mounted in the front coil spring. One advantage of this construction is that the front shock absorber can be easily removed without any extensive dismantling of the front end suspension which would disturb steering geometry. The telescoping shock absorber has longer range of action. Much wider range of camber adjustment is provided by having an adjustment at the upper arm pivot pin as heretofore and an additional adjustment at the upper arm pivot shaft.

The telescopic type shock absorbers at the rear are diagonally mounted ahead of the rear axle and protected against road damage by heavy steel shields secured to the lower mounting.

Another contribution to improved handling is the adoption of a front stabilizer bar of heavier section, providing greater resistance to tilt and side sway.

As mentioned earlier the engines remain the same except for certain detail changes in accessories. With the lowering of the hood line and radiator grille opening it was necessary to lower the position of both fan and water pump, the capacity of the latter being increased slightly. The fan was redesigned by increasing its diameter from 18 to 19 in., reducing pitch and fan



Closeup at rear end showing diagonally mounted shock absorber with protective shield at lower end. In the foreground is the hand brake cable revised and improved for 1949.

The ignition coil now is mounted on the engine, reducing the length of the high tension lead and thus reducing interference with television and radio reception.

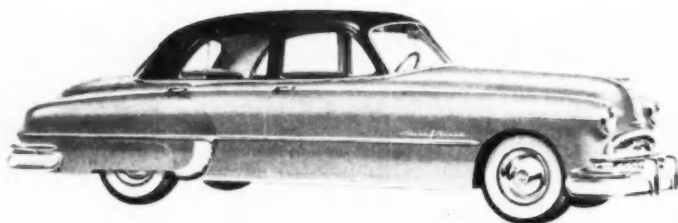
To improve the accessibility of timing marks, they have been eliminated from the flywheel and are now placed on the periphery of the harmonic balancer. The pointer is attached to a bracket mounted on the front of the engine.

A new type solenoid requiring no relay is used to operate the starting motor on all models. The instrument panel starter switch carries all the current required by the solenoid windings of which there are two—a pull-in winding and a hold-in winding. When the instrument panel switch is pressed, current flows through both solenoid windings moving the solenoid plunger to first shift the starter pinion into mesh with the flywheel ring gear and then close the main solenoid contacts to allow current to flow to the starting motor. At the instant the main solenoid contacts close, the pull-in winding is cut out and the starter is held in the engaged position only by the magnetic field of the hold-in winding thereby decreasing the current draw of the solenoid. The solenoid plunger is covered by a rubber boot to prevent any possibility of plunger freezing during icing conditions.

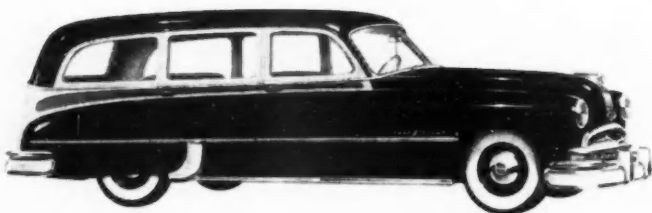
To guard against Hydra-Matic equipped cars mov-

speed at the same time. The fan is piloted directly on the water pump shaft instead of the water pump pulley.

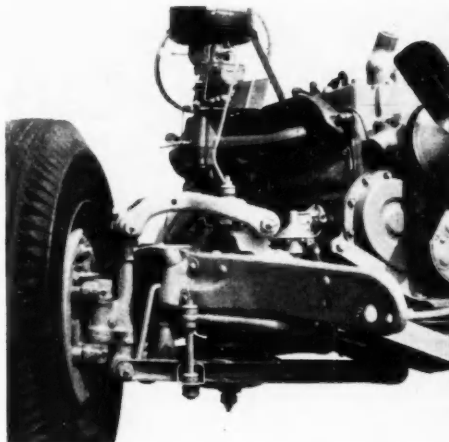
Another item affected by lowering the hood was the air cleaner and silencer on the eight-cylinder engine. This problem was met by the design of a compact and greatly improved type assembly which reduces induction noise level noticeably. Air is drawn through four silencing chambers, the first or "hiss" chamber being made more effective by the use of a coating of Neoprene on the lower surface of the jute pad cemented to the silencer ceiling.



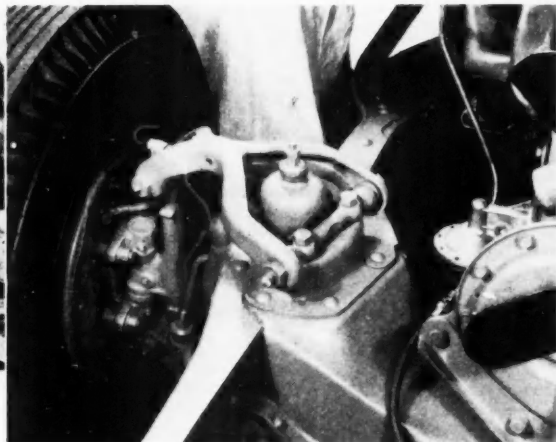
Chieftain series 4-door, 6-passenger sedan.



1949 station wagon with all-steel body. The model with wood body is practically identical in design and appearance.



Front view closeup of 1949 front suspension with direct-acting shock absorber mounted inside coil springing.



Top quarter view of new front suspension.

ing when started with the selector lever in a drive position (DR, LO, or R) they have a starter neutralizer switch placed between the instrument panel starter switch and starting motor solenoid. This neutralizer switch is in the off position, thereby preventing the solenoid from operating if starter button is pressed, except when the selector lever is in neutral (N) position.

Ease of generator regulator setting has been increased by the use of a screw adjustment to set spring tension on the three regulator units. This eliminates the necessity for bending the spring hangers on these units to secure spring tension adjustment as was formerly the case.

The 1949 distributors, both six and eight, continue use of the "high tower" distributor cap which was put into later 1948 production. This cap has built-in suppressors in each high tension terminal for decreasing radio interference. The main feature of the distributor is in the method of supporting the movable breaker plate which is moved by the vacuum advance diaphragm and linkage. This plate has three small Bakelite feet which rest on a support plate screwed to the distributor housing. A centrifugal advance similar to that used on 1948 models is incorporated in the 1949 distributor.

The battery is located on the left side of the engine and is mounted somewhat higher than heretofore. Because of the higher location, a cover is now placed over the battery to prevent any possibility of solution accumulation on the battery top contacting a serviceman's clothing while servicing the engine. A readily removable fill plate in the cover allows checking cell level and adding water.

A change has been effected in the wiring system of the car by grouping most accessory wiring in to the main wiring harness, and the adoption of a fuse and

terminal block to which all accessory wiring is connected. Moving the defroster to the engine side of the dash has made it possible to mount the accessory fuse and terminal block on the passenger side of the dash where it is readily accessible.

A new type of clutch pedal bearing consisting of a steel cup supporting a rubber-insulated brass bushing is packed for life with a viscous chassis lube.

The standard axle ratio is continued at 4.1 to 1; while the economy axle ratio of 3.9 to 1 will be available where specified. A mountain gear of 4.55 to 1 ratio also is offered. Cars equipped with Hydra-Matic drive will have a ratio of 3.63 as before.

The hand brake system has been improved in certain details while the front wheel service brakes have been increased in size to compensate for the forward shifting of mass. On 1949 models the front wheel brakes have lining width increased from 2 to 2¼ in. Eccentrics have been eliminated so there are only two brake adjustments at each wheel—the adjusting screw for expanding the shoes and the anchor pin. The hand brake now is fitted with a cane type control handle while the cables for actuating the rear brakes have been made freeze-proof by the addition of close fitting rubber seals at the point where the flexible cable enters the metal conduit.

Steering wheel rigidity has been improved by increasing column jacket diameter from 1½ to 2 in. and by increasing wall thickness.

Owing to the increased length of the fuel filler pipe, provision has been made to improve the method of anchorage, the filler now being held securely at two points. Venting also is improved by the addition of a vent hole in the top of the filler pipe just inside the tank.

On the new models the gas tank is mounted to the

(Turn to page 70, please)

1949 Plymouth and Dodge Cars

Shorter Wheelbase Models Expected to Sell at Lower Prices. DeSoto and Chrysler and Regular Lines of Plymouth and Dodge to Have Longer Wheelbases Than in 1948. Bodies will Feature New Styling and Lower Overall Height with No Decrease in Headroom. Engines will Have Higher Compression Ratios and will be Stepped Up Moderately in Horsepower.

By Leonard Westrate

THE first of the much discussed lower priced, smaller cars to be placed on the postwar market by one of the large producers will make its appearance soon. Plymouth Division of Chrysler Corp. will offer such a car soon after its regular 1949 models are announced to the public in March. That is the most significant revelation made at the Chrysler Corp. "on the record" preview of new models held for the press in Detroit Jan. 14. A similar development of almost equal significance was the showing of a new shorter wheelbase model by Dodge Division. Both new series are aimed at capturing the buyer who feels he has been forced out of the higher price markets.

While the showing was on the record, no printed specifications or pictures were available, so that all information about the cars was obtained by personal observation or through interviews with factory officials. With the exception of the short wheelbase models in the Plymouth and Dodge lines, all models,

including Chrysler and De Soto, feature tangible increases in wheelbases. This is significant in view of a reverse trend in some of the other makes. Actually the increase is effected in conjunction with a decrease in overall lengths. The cars are from $1\frac{5}{8}$ to $2\frac{1}{4}$ in. lower in height with no decrease in headroom, although tunnels are more pronounced, and from $1\frac{3}{4}$ to $3\frac{3}{4}$ in. narrower overall, but substantially wider inside. An important point is that fenders still are separable for removal and replacement in case of damage. However, styling is in keeping with the postwar trend, with lines sweeping back in an unbroken line to the rear fender, which provides a slight protection for the rear door sheet metal by extending away from the body slightly. Flat glass is used in all windshields, which are V-shaped. All four-door sedans shown were of the two-window type with the trunk or "bustle" back. All rear doors now are hinged from the center post, a definite improvement from the safety viewpoint.

Plymouth will not have a fluid coupling, however, the improved form of semi-automatic transmission currently used in Chrysler and De Soto models will be offered as optional equipment on the Dodge Coronet line.

The new smaller Plymouth, which has a wheelbase of 111 in., will be available in three body styles—an all-steel station wagon called the "Suburban," a three-passenger coupe, and a two-door sedan. The latter two will not be offered this year in the regular Plymouth line, which has a 118½ in. wheelbase. The cars appear to be about as large overall and in the interior as the regular line, but trim and appointments are much more austere in keeping with lower prices. Plymouth has not actually labeled the car as a low-priced vehicle, since prices were not revealed, but the implication in both

Comparative Wheelbases of Chrysler Corp. Passenger Car Line

	Wheelbases	1949	1948
Plymouth (small series)		111 in.	
De Luxe and Special De Luxe Series		118½ in.	117 in.
Dodge (smaller series)		115 in.	
Coronet and Meadowbrook		123½ in.	119½ in.
De Soto		125½ in.	121½ in.
Chrysler Eight		131½ in.	127½ in.
Six		125½ in.	121½ in.

Offered on Two Wheelbases

size and general appointments is inescapable that it is slanted directly to a new low price market. We understand that engine and chassis are standard Plymouth units modified where necessary to fit the smaller wheelbase.

The new Dodge line is on a 115 in. wheelbase compared with 123½ in. for the regular line, which has been increased 4 in. and will be available in two lines, the Coronet and Meadowbrook, which correspond to the former Custom and Deluxe. The new smaller car will have a wheelbase 3½ in. shorter than the larger Plymouth, which raises some interesting speculation about where it will fall in the price range. It will be available in three body styles—business coupe, two-door sedan, and a roadster equipped with lift-out glass side windows and a hand operated soft top. In keeping with its low price goal, there is no power-operated equipment for raising windows or top.

Overall weights of all the 1949 Chrysler models was not given officially, but it is reported that they are only very slightly increased (less than 100 lb for the one with the largest increase), due perhaps to the greater glass area.

Although the basic mechanical units of Chrysler Corp. cars remain relatively unchanged, each division has incorporated many detail improvements. Consider the suspension system, first, since that is so intimately related to the new bodies and styling.

The increase in wheelbases has been accomplished in combination with a reduction in the sheet metal overhang at both ends. This process has changed weight distribution. So far as we could learn weight distribution now is about 57 per cent at the front and 43 per cent at the rear.

This change also has made it necessary to provide
(Turn to page 60, please)

Federal's New Utility Truck

Model 15M Has Nominal Rating of ¾ to Two Tons and Is Available

in Five Wheelbases from 135 to 194 In.

A NEW utility truck model—the Model 15M—designed for a wide variety of uses by contractors, farmers, for city delivery, and similar applications where a heavy duty, light weight vehicle is desirable has been announced by Federal Motor Truck Co. Available in five wheelbases—135, 146, 167, 180, and 194 in. — this model expands the Federal line to a grand total of 42 models ranging from ¾ ton to 35-ton rating, providing 375 combination of gasoline and Diesel power, including six-wheelers.

The Model 15M has a nominal rating from ¾ to two tons. Nominal rating for single tire equipment with standard 6.50-20 tires is ¾ to 1½ ton; with 6.00-20 single front and dual rear, 1½ to two tons. Larger cross-section tires are available as optional

equipment. This model will have a variety of body types, including — utility express, stake, etc. With single tire equipment GVW rating is 12,000 lb; with dual tires rear, 14,500 lb.

With respect to mechanical units, this model lists
(Turn to page 62, please)

Federal Motor Truck Chassis Specifications

	Model 15M				
Wheelbase (in.)	135	146	167	180	194
Chassis weight (lb.)	3950	4000	4105	4170	4240
Cab to axle (in.)	56¾	67	88	101	115
Suggested body length (ft.)	8	9	12	14	16

Chassis weight shown is with 6.50-20 single tires. Weights are slightly higher for larger single or dual tire equipment.

New Bodies and Numerous Mechanical

DISTINGUISHING the Chevrolet offering for 1949 are entirely new bodies with advanced features of eye appeal, and a number of interesting mechanical changes and improvements which supplement the familiar basic design of major units. Biggest news, of course, is the line of new wider bodies with wider front and rear seats, and greatly increased glass area both in the windshield and rear window.

This has brought with it important changes in the chassis, particularly the redistribution of weight and a forward shifting of the powerplant. The engine has been moved forward four in., shifting the mass closer to the front axle and moving the rear seat location forward of the rear wheel house. This change contributes to the lowering of roof level and the increased width of seats and body space. At the same time the wheelbase has been made 115 in., a reduction of one in.

The '49 line will carry two series of cars—Fleetline, and Styleline with deluxe treatment offered as an option in most body types. The Fleetline series features two- and four-door sedans only, the body style being of the type known to the trade as "fast back." The Styleline series features sedans of the "notch back" or "trunk" back type and includes the following body types; two- and four-door sedans, sport coupe, three-passenger business coupe, convertible, and wood and all-steel body station wagons.

Coming to the mechanical changes of significance, some decrease in weight is expected because of the reduction in wheelbase and a slight reduction in frame width and weight. The frame is slightly narrower and continues the sturdy box girder construction which, coupled with new design detail, has made possible a weight reduction of about

four per cent without any sacrifice in rigidity. Other weight savings are reported in the front suspension and in seat cushions where flat continuous "S" springs replace conventional coil springs. The instrument panel is welded to the front end structure, thus combining improved strength and rigidity with weight saving.

The familiar Chevrolet valve-in-head engine remains the same in specification details but includes some improved features. Spark plugs of 14 mm size replace the former 10 mm size, retaining the same heat range but providing a stronger shell and increased clearance volume. An improvement in the carburetor is a fuel-lubricated accelerator pump. The pump is submerged in gasoline, making it impossible for air to reach the pump seal. Another feature is the addition of a fast-idle mechanism which permits proper variation in throttle opening with choke position.

Compression ratio has been upped from 6.5 to 1 to 6.6 to 1 and at the same time tendency to pinging has been reduced by changing to flat head intake valves. Horsepower remains the same. Engine front mounts have been changed to reduce tendency to clutch chatter. So far as the electrical system is concerned, the major change is the adoption of a positive shift solenoid starter actuated by a push button on the instrument



Two station wagons are offered, similar in design, but differing in structure, in addition to this wood body type, an all-steel body is available, finished to resemble wood.

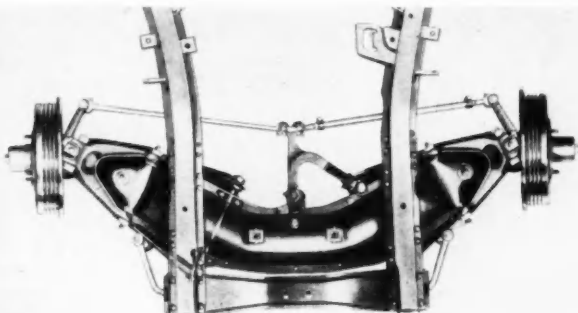


Styleline De Luxe four-door sedan which features a wider, lower body.

Improvements on '49 Chevrolets

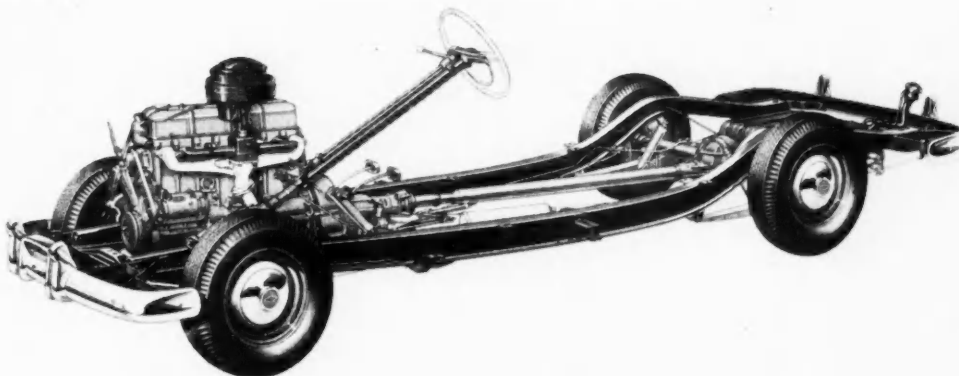


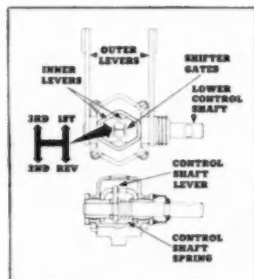
A longer transmission case permits forward location of the engine without change in the torque tube or propeller shaft.



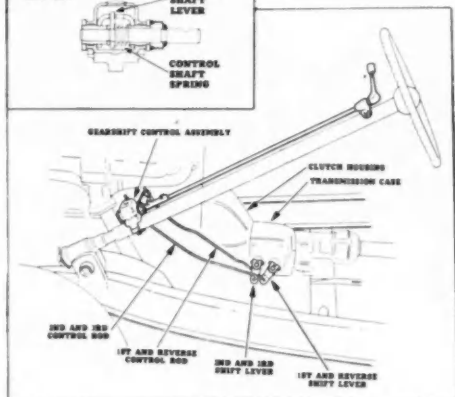
Changes in the chassis include a redesigned frame and improved front suspension system. Note the angle at which the rear shock absorbers are mounted.

As shown in the top view, the new front suspension cross member serves as a front engine support in the center and as a housing for the coil spring assemblies at the outer ends. Center-point steering linkage equalizes effects of road shocks. The lower illustration (cutaway) shows the mounting of front shock absorbers inside the coil springs.





Chevrolet's new manual gear shift mechanism which eliminates the former vacuum type shift equipment.



panel. The starter functions with ignition off or on. The previous distributor polarity reversing switch has been discontinued. This change eliminates the need for an insulated breaker plate and simplifies the primary wiring.

To eliminate the possibility of joint leakage the attachment of the exhaust pipe to the manifold has been changed to a stronger, tighter flange and gasket joint.

Owing to chassis changes the muffler is two in. shorter, but has four silencing chambers instead of three. The tail pipe is now of oval section.

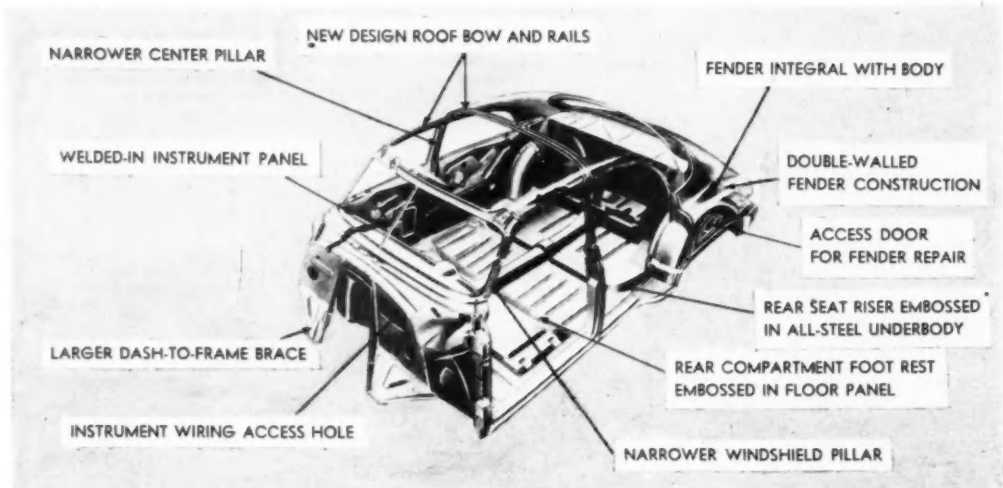
The oil filler has been relocated to the top and front of the valve rocker cover. Improved lubrication of timing gears, particularly at low speeds, is effected by positive oil flow and a larger diameter outlet nozzle. Tooth wear on the flywheel ring gear has been reduced by eliminating gear tooth chamfer.

The familiar vacuum type gear shift mechanism has been replaced by a fully manual gear shift. The gear set remains the same as before save for the addition of a rear case extension to make up for the forward shifting of the powerplant, thus leaving the propeller shaft and torque tube unchanged. The extension has an additional support bearing at the universal-joint front yoke, affording ready replacement of the torque ball socket.

The front (SLA) suspension is entirely new, with coil springs of heavier gage and of slightly higher rate and direct-acting shock absorbers mounted inside the coil springs. The shock absorbers can be readily removed without affecting front wheel alignment adjustments. The upper and lower suspension arms now are stampings instead of forgings. The ride stabilizer is unchanged but is attached to the lower control arms instead of the spring seats. Front tread is reduced to 57 in. With the adoption of low-pressure tires and 15-in. wheels, wheel hubs are $\frac{3}{4}$ in. less in diameter and have five bolts instead of six. The front suspension cross member is new, and features a semi-circular cross-section and nearly flat cover plate.

The rear suspension has new semi-elliptic springs of lower rate (seven per cent less) with seven leaves instead of eight. The new shackle angle is said to give

(Turn to page 70, please)



This cut-away view shows how floors, roof bows, dash panels, pillars and braces have been designed to complement each other for structural unity.



Here is a view of a few of the large presses in the recently expanded Kaiser-Frazer press shop at Willow Run.

Kaiser-Frazer's Expanded Press Shop at Willow Run

THE final phase of the major expansion program in the Kaiser-Frazer press shop was completed recently, providing the company with streamlined facilities of advanced type for the production of the variety of stampings used in building the current line of automobiles. The backbone of the operation now includes 42 large presses of latest design of single action, double-action, and triple-action type. Included in this group are—a new 1500-ton Clearing triple-action press and two, 1500-ton triple-action Hamilton presses which were installed earlier in the program.

Numerically the press shop is dominated by Clearing presses of various sizes and types. The latest additions, however, include four, 350-ton single-action Bliss presses with 108-in. bed, and a number of smaller Bliss and Toledo units. Among the smaller presses are 18 Warco units, the majority being rated at 75 tons capacity, one big unit being rated 300 tons. Altogether the press shop boasts a total of 76 presses ranging from 1500 tons to 75 tons and less.

The K-F press shop has been arranged in groups of units designed for handling the wide variety of parts in the most economical fashion. Conservation of floor space and the desire to hold capital investment to an economic level were the basic considerations in planning this operation. Stemming from this philosophy

groups of parts for the various models, selected for similarity of press operations, are scheduled over the various groupings of presses. Distinguishing characteristic of the K-F press shop, therefore, is that instead of setting up long seasonal runs for each press—as is customary practice in large automobile plants—parts are scheduled in economic long runs, then the dies are changed over to accommodate the succeeding run. K-F now produces most of the parts used in making bodies for the 1949 line.

To illustrate this method of scheduling, the initial blanking operations for all parts, except the roof panel, is done in three Clearing presses located at the start of the department. The two large, 132-in. bed Clearing presses handle the front fender and hood top, the rear quarter and cowl upper panel. A smaller, 84-in. bed Clearing blanks the Kaiser instrument panel, center pillar, and rear stone deflector. In the vicinity of the three blanking presses there is a battery of three of the latest type McKay-Budd roller leveler machines capable of rolling sheets 96 in. wide. These are used for leveling and oiling all large blanks prior to the drawing operations.

One small group of presses, consisting of 108-in. bed units, and including a double-action Clearing and three

(Turn to page 78, please)

Preparedness Plans and Communism Are Portrayed

Fig. 1—Range in octane number requirement of engines of same make and model.

Intense Interest in Torque Converters, Engine Octane Requirements and Other Technical Subjects at Annual Meeting in Detroit

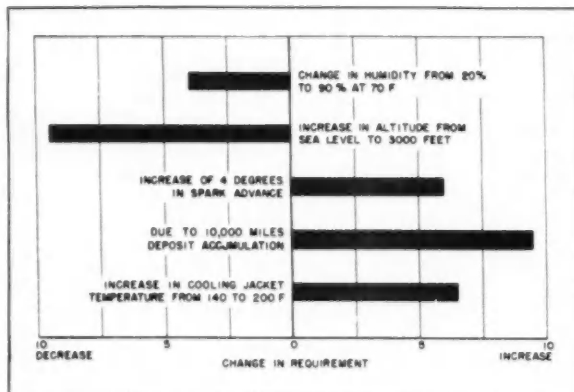
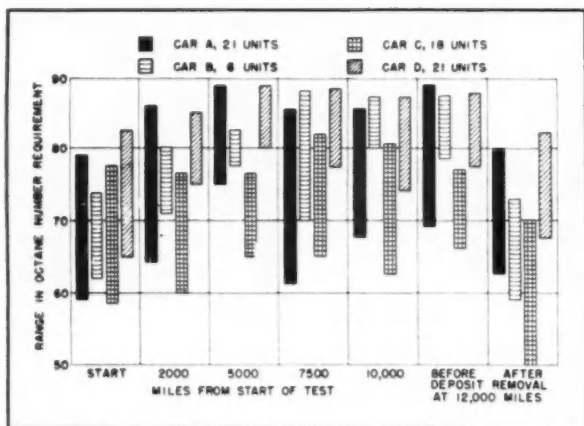


Fig. 2—Average effect of variables on octane number requirement. All values based on a normal requirement of 80 octane number (motor).

MAIN attractions at the 1949 annual meeting of the Society of Automotive Engineers were 22 technical sessions, a big engineering display, numerous technical committee meetings and speeches by Paul G. Hoffman, head of the Economic Cooperation Administration, and Lieut. General Leroy Lutes, director of the staff, Munitions Board of the National Military Establishment. Many hundreds of engineers and company executives gathered there for the five-day meeting.

Mr. Hoffman, president of Studebaker before becoming administrator of the ECA last year, spoke on the subject, "Recovery—the Road to Peace." Having recently returned from a round-the-world inspection trip, he gave the engineers some first hand observations on the operations of Communism and its all-out drive to achieve world dictatorship by promoting satellite police states dominated by the Kremlin. Communism was portrayed as a deadly menace that can only be stopped by counter operations on three fronts—economic, political, and military preparedness. He gave evidence of how Western Europe is recovering under the Marshall Plan and cited two instances of executive aid from the automobile industry—Charles E. Wilson, president of General Motors, as a member of a committee investigating surplus plants in Germany, and Ernest R. Breech, executive vice-president of Ford Motor Co., as a member of the Anglo-American Council on Productivity to study the output per hour per man in British industry.

In a war emergency, the automobile industry would be among the first to con-

Menace of to SAE

By James R. Custer

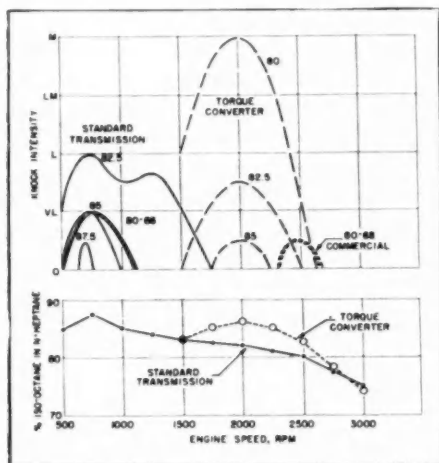


Fig. 3—Octane number requirement and knocking tendency with torque converter and standard transmissions. 80-88 indicates Motor and Research octane number of commercial gasoline. All other numbers indicate octane number of reference fuels.

vert to war production, it was indicated by General Lutes, in outlining the preparedness plans now being formulated for national security. He believes war is not imminent, unless an "incident" occurs, but if war comes: "Potential impact of preparedness programs upon the automobile industry is enormous, for no other single industry affords the Armed Services of the Nation a greater actual or convertible productive capacity. The magnificent production record of the automobile industry in World War II is very firmly in the minds of those of us who are responsible for developing the plans and programs that will be the basis of industrial support required by the Armed Forces in case of war."

Definite commitments to industry on requirements are not being made now due to the fact that a strategic

1949 SAE Officers

PRESIDENT—Stanwood W. Sparrow, vice-president in charge of engineering of Studebaker Corp. **VICE-PRESIDENTS**—**AIR TRANSPORT**, R. C. Loomis, director of flight, Consolidated Vultee Aircraft Corp.; **AIRCRAFT**, Dr. Karl Arnstein, vice-president of engineering, Goodyear Aircraft Corp.; **AIRCRAFT POWERPLANT**, vacancy created by the recent death of W. J. Blanchard to be filled by the new Council; **BODY**, Frank S. Sjing, chief stylist, Hudson Motor Car Co.; **DIESEL ENGINE**, Max M. Roensch, research coordinator, Ethyl Corp.; **ENGINEERING MATERIALS**, H. B. Knowlton, supervisor of materials engineering, International Harvester Co.; **FUELS & LUBRICANTS**, H. L. Moir, technical advisor, Pure Oil Co.; **PASSENGER CAR**, George B. Allen, staff engineer, Chrysler Corp.; **PRODUCTION**, L. C. Goad, vice-president, General Motors Corp.; **TRACTOR & FARM MACHINERY**, L. A. Gilmer, chief engineer, Oliver Corp.; **TRANSPORTATION & MAINTENANCE**, J. L. S. Snead, Jr., vice-president of Operations & Maintenance, Consolidated Freightways, Inc.; **TRUCK & BUS**, E. P. Lamb, chief engineer, Truck Division, Chrysler Corp.; **TREASURER**—B. B. Bachman, vice-president, Autocar Co.; **NEWLY-ELECTED COUNCILORS**—G. E. Burks, chief engineer of Caterpillar Tractor Co.; N. H. Daniel, manager of the Diesel Engine Division, General Motors Products of Canada, Ltd.; and E. A. Ryder, consulting engineer, Pratt & Whitney Aircraft. Councilors elected last year and who have another year to serve are F. W. Fink, chief engineer, Consolidated Vultee Aircraft Corp.; P. E. Hovgard and Elbert E. Husted, president, Titeflex, Inc.

plan is being tested as to its industrial workability and impact upon the civilian economy, General Lutes explained. If the plan is found feasible and adopted by the Secretary of Defense, then industrial requirements will take definite form. The strategic military plan was made by the Joint Chiefs of Staff, followed by collaboration on requirements by the Munitions Board, Army, Navy and Air Force, after which the Munitions Board and National Securities Board determine its feasibility.

Another phase of preparedness is the Facilities Allocation Program, a survey of the industrial capacity for war eventually covering 22,000 to 25,000 plants, or 90 per cent of the United States productive capacity.

Of the 1200 new plants built by the Government for World War II at a cost of \$14 billion, plus an expenditure of \$9 billion for expansion of plants and facilities, 157 plants have been established by the Armed Forces as reserves. About 77,000 tools have been withdrawn from surplus stocks and placed in Government storage. In addition 40,000 additional tools have been tagged for reserve and are being acquired. The Munitions Board recently authorized an increase in the reserve to 182,000 items.

Of the 48 companies participating in the SAE engineering display, several of them announced new products. Titeflex, Inc. showed the Grannan centralized lubrication system which it will manufacture for installation on machinery, trucks and buses. Aluminum Co. of America announced it soon will

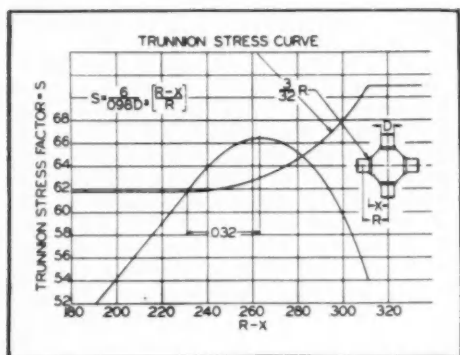


Fig. 4—Stress curve for universal joint trunnion.

place in production aluminum wheels of the spoke type for trailers and the disk type for trucks and buses. Pierce Governor Co. displayed its new transmission governor and new hydraulic governor for large engines of 1500 to 2500 cu in. displacement. A sump (Sedisump for installation at the bottom of oil filters was demonstrated by DeLuxe Products Corp., which also announced the development of a thermo-oil filter for quick warmup and temperature control of delivery truck engine oil. It is jacketed with water from the engine and is reported to maintain the oil temperature at about 160 F. Other companies to announce new products were American Bosch Corp.—electric windshield wiper motor; Sparks-Withington Co.—electric red flasher road light for commercial vehicles; Scully Signal Co.—Fil-Gard signal device, a standard accessory for 1949 Ford cars for installation in fuel tank filler tube to avoid gasoline spillage.

At the business session Stanwood W. Sparrow, vice-president in charge of Studebaker engineering, was introduced as the 1949 president of the society. Elected vice presidents, treasurer and councilors also were announced. They are listed elsewhere in this article. The 1947 Horning Memorial Award was pre-

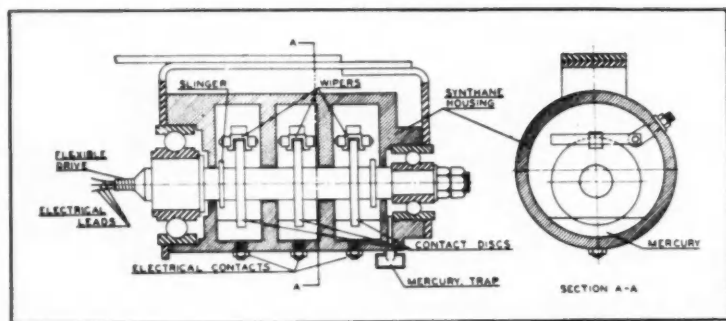


Fig. 6—Slip ring mechanism for strain gage testing.

sented to Adolphus C. Pilger, Jr., Tide Water Associated Oil Co., in recognition of his paper, "Field Testing of Motor Oil and Gasoline," which he gave in 1947.

Interest ran high at the technical sessions, particularly those on torque converters and engine octane requirements. In all 37 papers were presented during the meeting, some of which are reviewed here.

Octane Requirements Variables

How complex the problem of engine octane requirement actually is was brought out in a paper by Harold J. Gibson, research coordinator for the Ethyl Corp., who offered extensive test data to show the effect of atmospheric variables and combustion chamber deposits produced by various combinations of fuels and lubricants. Data on ignition timing, hot spot temperature, cooling jacket temperature, and the atmospheric variables—humidity, pressure and temperature—were given in the paper.

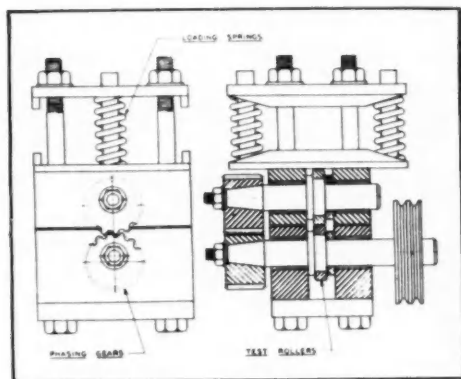


Fig. 5—Gear roller test machine.

Even engines of the same make and model were found to vary in their requirements as much as 20 octane numbers. This variation is shown in Fig. 1,

based on tests made with 66 passenger cars as tabulated at the top of the chart. The average effects of five other variables are given in Fig. 2.

To determine the effect of torque converters, tests on a chassis dynamometer with a torque converter drive and a standard transmission gave the results in Fig. 3. The upper portion of the figure shows audible engine knock intensity curves and the lower curves the requirement over the speed range. The former

discloses that a typical commercial fuel, in this case a gasoline of Motor and Research octane ratings of 80 and 88, that satisfies the engine requirement at low speed with a standard transmission will also satisfy its requirement with a torque converter.

Attempts to develop an infinitely variable ratio, fully automatic transmission began in the early days of the automobile. Starting with the Owen magnetic elec-

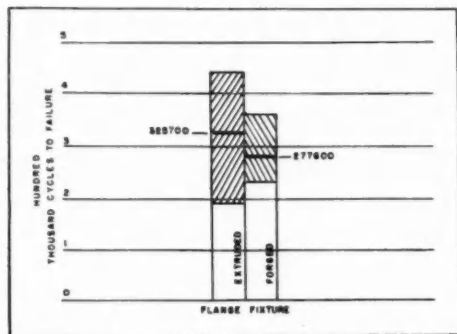


Fig. 7—Comparative fatigue life of Ford front spindle—extruded and forged.

trical drive and the Carter car friction drive in America, the Constantinesco mass inertia drive and the DeLavand drive in France, Oliver K. Kelley, General Motors transmission engineer, traced the history of this field of transmission development up to and including modern hydraulic torque converters—the White Hydro-Torque Drive and the Buick Dynaflo. The latter part of his paper was devoted to an analysis of flow losses and shock losses in a torque converter and their effect upon its efficiency.

Diesel Costs Lower

"Diesel Versus Gasoline Engines" was the subject of a symposium at which E. N. Hatch of the Board of Transportation, New York City Transit System, presented the bus side of the picture and Howard L. Willett, Jr., executive vice president of the Willett Co., for trucks. Although they used different bases of analysis, both speakers came to the same conclusion—that the Diesel engine is more economical than the gasoline engine for the respective operations analyzed by them.

Mr. Hatch stated that his survey covered 1744 new buses purchased since 1946, of which 1234 have Diesel engines and 510 gasoline engines. Records of the New York City Transit System show, he said, that there is a

saving of about \$500 per year per bus in fuel costs with the Diesel engine as compared with the gasoline engine costs for buses of 40-passenger size and over, and where the cost per gallon of Diesel fuel is the same as the cost per gallon of gasoline.

Mr. Willett proposed the cutaway method of cost analysis rather than the historical approach and used it for his analysis. In applying the cutaway method cost records were selected of those trucks which carried the same load over the same terrain during the same short calendar period for all vehicles involved. For his analysis Mr. Willett used a gasoline delivery operation in Chicago and comparative cost data, which are given in Table I, show a saving of \$8620 for the Diesel powered vehicles.

Universal Joint Failures

In discussing problems encountered with universal joints of the Cardan type on automobiles, the point of ultimate breakage is usually a cross trunnion, according to George E. Dunn, chief engineer, Universal Products Co., Inc. This failure usually follows a breakdown of the bearing and is due to fatigue. Fig. 4 shows why failure at the trunnion, a cantilever beam, can be expected. It is subjected to the worst possible condition of endurance life—complete stress reversal, and in addition, changes in direction of stress are caused by varying angles of the joint while under torque load.

Gear testing methods as used by Caterpillar Tractor Co. for the development of heavy duty gearing were explained by R. P. Van Zandt and B. W. Kelley. For studying the metallurgical variables of gear teeth, such as pitting and scuffing, a roller test machine has been built, a drawing of which is shown in Fig. 5. It operates on the same principle as a machine made by Brown-Boveri. The two rollers bear against each other by a determined spring load and in addition to rolling, they are made to slide by means of a pair of eccentrically mounted phasing gears connected to the roller shafts.

For using strain gages on a load shaft with a single mesh gear test machine, the slip ring problem was solved by developing the mechanism shown in Fig. 6.

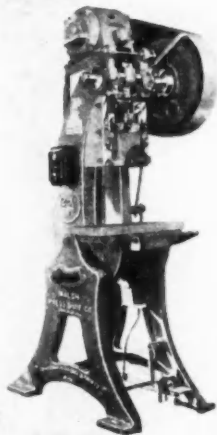
(Turn to page 64, please)

Table I—Comparative Cost Data for Diesel and Gasoline Powered Vehicles

DIESEL POWERED				GASOLINE POWERED			
Age (Years)	Cost Per Mile	Miles Per Year	Cost Per Year	Age (Years)	Cost Per Mile	Miles Per Year	Cost Per Year
1st	8:	38,000	\$2,880	1st	10:	38,000	\$3,800
2nd	9	38,000	3,240	2nd	15	38,000	5,400
3rd	10	38,000	3,600	3rd	15.5	38,000	5,580
4th	11	38,000	3,960	4th	16.5	38,000	5,940
5th	11.5	38,000	4,140	5th	17.0	38,000	6,120
6th	12.5	38,000	4,500	6th	17.5	38,000	6,300
Operating Cost			\$22,320	Operating Cost			\$32,940
Original List Price			9,500	Original List Price			7,500
Gross Cost—Six Years			\$31,820	Gross Cost—Six Years			\$40,440

B-18—Flywheel Punch Press

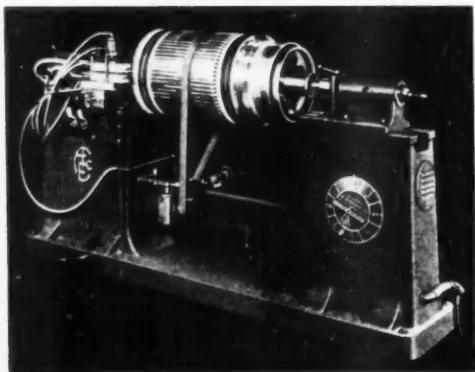
Model No. 12X O.B.I. flywheel punch press has recently been added to the line of punch presses manufactured by the Walsh Press and Die Co., Division



Walsh No. 12X O.B.I. deep throat open back inclinable flywheel punch press

of American Gage and Machine Co., Chicago, Ill. This No. 12X is not only suitable for die-casting trimming operation but also for secondary forming operations on sheet metal as well as many other punch press operations. The press is available with $\frac{1}{2}$ in. to 4 in. stroke and 9 in. shut height, with throat depth of 6 in., making it adaptable for operations where bulky dies with low tonnage are required.

These No. 12X models are furnished completely motorized, or can be furnished with a variable speed motor. The Walsh two-button safety device with non-repeat attachment as well as air ejectors can also be furnished.



American Fusion stationary brazing machine, Model CBG-24

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 54

B-19—Stationary Brazing Machine

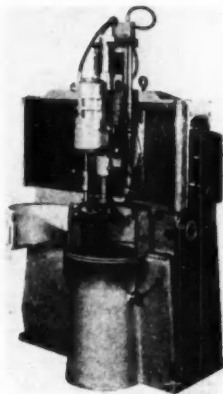
A new stationary brazing machine for brazing and silver soldering of electric generator and armature coil ends has been announced by the American Electric Fusion Corp., Chicago, Ill.

The CBG-24 brazing machine is said to have been proved in use for many years in the plants of a Diesel locomotive manufacturer, and is said to eliminate guesswork, make-shift brazing set-ups, and to insure uniform brazing results that meet most rigid specifications.

The CBG-24 accommodates armatures from 18 in. to 42 in. in diam. and with slight factory changes, can handle armatures of any size. The unit can also be used as a source of power supply for portable brazing equipment, and for other brazing and soldering applications. The brazing machine has a built-in heavy duty 24 KVA transformer with auto-regulating coil and 8 point heat control selector for operation under exacting conditions, with a wide range of brazing heats for all size jobs. All common forms of brazing alloys may be used, such as foil, wire, strip and powder. Dimensions are 49 in. high by 24 in. wide by 99 in. long; weight 2400 lb. Installation requires only connections to water, air and power supply lines.

B-20—Vertical Universal Grinders

The Springfield Machine Tool Co., Springfield Ohio, now offers new models of hydraulically operated TR series vertical universal grinders in two sizes



Springfield hydraulic vertical universal grinder, TR-series

with swing capacities up to 32 in. dia and nominal grinding capacities of 24 in. dia.

With this vertical design of grinder, work is laid on a solid foundation instead of being suspended. Hence work visibility, set-up convenience and vibration conditions due to gravity are greatly improved.

These new vertical grinders are provided with swiveling wheel head slide, solid adjustable stops, variable feed, tarry control, facing feeds, etc. These fixtures and others are said to afford extreme control of related tolerances where several consecutive operations are completed in one set-up of the work involving combinations of internal, external, face, shoulder and angular grinding.

B-21—Quick Change Gear Lathes

A new series of 13 in. swing toolroom and quick change gear lathes is now being manufactured by the South Bend Lathe Works, South Bend, Ind. New features include an improved headstock spindle with increased bore and collet capacity, new tailstock base with improved bed way wiper system, and new one-point oiling system for reverse lever bracket and twin gear bearings.

The new headstock spindle has a 1 $\frac{3}{4}$ in. bore and will take No. 5 South Bend collets which have a maximum capacity of 1 in. This increased spindle capacity permits machining 1 $\frac{3}{4}$ in. bar stock fed through the spindle and a suitable

chuck. Bar stock up to 1 in. may be fed through the spindle and No. 5 South Bend draw-in collet assembly. The bearing surfaces on the spindle are superfinished to a smoothness of 5 micro-inches (profilometer reading .000005 in. rms) and have a hardness of 56 to 61 Rockwell C.

The spindle turns in split sleeve bronze alloy bearings. The sleeves are bearingized to provide best possible surface finish and final precision fit. Large individual oil reservoirs and an improved capillary oiling system provide a complete film of clean filtered oil. When properly operated there is no metal to metal contact in the bearings, no wear and no friction other than the fluid friction of the lubricant. The oil is returned to the reservoirs from the bearings so that only an occasional replenishing is required.

The new tailstock base wiper system is designed to keep the bed ways for the tailstock base free of chips, grit and dirt. Tailstock alignment remains accurate and the bed ways are not subject to the wear encountered when foreign matter is present under the tailstock. The new one-point oiling of the reverse lever bracket and the twin gear bearings saves maintenance time and makes more certain that the twin gear bearings enclose.

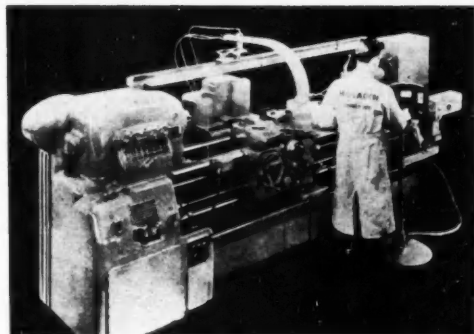
General specifications of the new 13 in. lathes are: 13½ in. swing over bed; 7½ in. swing over saddle cross slide; 48 pitches of screw threads—4 to 224 per inch RH or LH; 48 longitudinal power feeds—.0015 in. to .0841 in. RH or LH; 48 power cross-feeds—.0006 in. to .0312 in.; 8 spindle speeds—34 to 875 rpm; 4, 5, 6 or 7 ft bed lengths; 1½ in. hole through spindle and a maximum collet capacity of 1 in.

The No. 5 South Bend collets used are available in 61 fractional capacities down to 1/16 in. for round stock. Decimal sizes, metric sizes and square or hexagon No. 5 collets can be supplied. These collets are interchangeable with those used on 10 in., 14½ in., 16 in. and 16 24 in. South Bend precision lathes.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 54.

Turning machine attachment for lathes, offered by Monarch Machine Tool Co.



B-22—Turning Machine Attachment

Said to combine the features of a modern flexible engine lathe, the production economies of automatic cycling and template control of size and contour, a new turning machine attachment known as the "air-gage tracer-packaged unit" is released by the Monarch Machine Tool Co., Sidney, Ohio. This latest Monarch innovation is designed for application to Monarch 16 in. and 20 in. Series 60 engine lathes,

20 in. Model "M," 25 in. Model "N" and 32 in. Model "NN" engine lathes.

Used with the air-gage tracer, the packaged unit includes an electronically controlled motor drive coupled to the right end of the leadscrew. The control system provides stepless variation of the carriage feed rate in a range of ½ to 20 in. per minute. Rapid traverse return of the carriage is fixed at 100 in. per minute.

A floor stand carrying the control panel for the unit may be positioned for greatest operator convenience. The panel contains switches for energizing the control, starting, stopping and reversing the cycle.

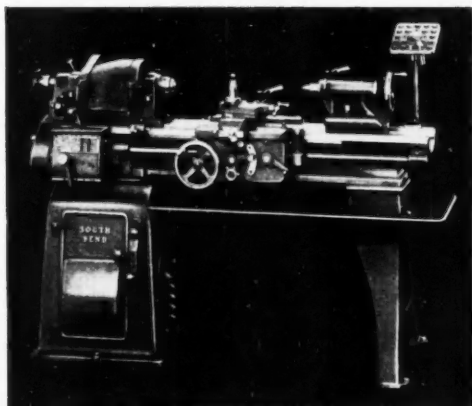
A large indicator, calibrated in in.

per minute, is mounted on the panel and makes it easy to select the exact feed desired. It also provides a visual check on the feed at any time. An interval timer is provided to time accurately the start of the carriage feed in the required relationship to the air-gage tracer cross feed. Adjustable bed-mounted stops are provided to stop the feed and to start and stop the rapid traverse as desired for the part being machined.

If the lathe has been operating as a conventional engine lathe, conversion to automatic cycling can be made, it is claimed, in three minutes or less. It is only necessary to disengage the gearbox, engage the packed unit drive and energize the electronic control.

The air-gage tracer-packaged unit combination is said to be particularly suited to multiple diameter and contour turning. The smooth, stepless finish imparted to the work by the air-gage tracer frequently eliminates the need for subsequent grinding operations; and where grinding is required, the grinding allowance may generally be reduced by one-half, the manufacturer states.

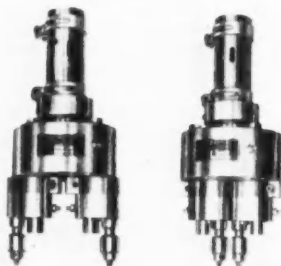
In providing template control of size and shape, the air-gage tracer eliminates repetitive measurements, expensive form tools and multiple tool setups and reduces greatly the amount of work spoilage.



South Bend 13 in. swing lathe with 1 in. collet capacity

B-23—Adjustable Drilling Head

Errington Mechanical Laboratory, Inc. Staten Island, N. Y., is marketing a new adjustable drilling head which permits the user to take advantage of



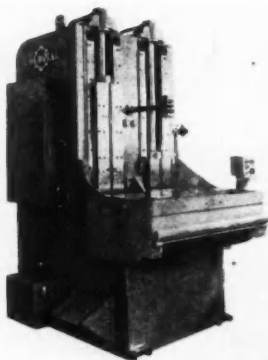
Errington adjustable drilling head

a wide range of adjustment without overhang, as illustrated in the contracted and extended settings pictured. The Errington adjustable drilling head can also be supplied with three spindles for equal adjustment in line and three, four, five or six spindles for equal adjustment on bolt circles. Range accommodation is from 0 to 1½ in. drills.

The adjustable head is fully geared. Needle bearings are on all spindles in the head. Ball thrust bearings are provided throughout, bronze bushed. Case is sand cast aluminum. All parts are fully enclosed for pressure lubrication and protection. The head has non-slip positive clamping on all adjusting members.

B-24—Dual-Ram Broaching Machines

A complete line of Dual-Ram broaching machines comprising nine basic



Colonial Dual-Ram 10-ton, 42-inch stroke broaching machine

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 54.

sizes is being presented by Colonial Broach Co., Detroit, Mich., designed specifically for surface broaching. The Dual-Rams feature completely new hydraulic and all-electric control systems, a cycle control system virtually eliminating machine idle time for reloading, and a forward-and-reverse jog cycle to simplify setting up. The complete line of machines includes the 6-ton, 42- or 54-inch stroke; 10-ton, 42-, 54- or 66-inch stroke; 15-ton, 48- or 66-inch stroke; and 25-ton, 48- or 66-inch stroke.

With the new all-electric cycling control, the machine can be set by means of the standard controls to operate on: (1) automatic continuous cycle; (2) single cycle or semi-automatic cycle with pre-set control (the machine continuing into the next cycle without stopping if a button is pushed before the first cycle has been completed); and (3) forward or reverse jog cycle, with ram and platen movements interlocked to prevent accidental damage to broach or part.

All hydraulic and electrical control units are group-mounted in two accessible panels on the sides of the machines. The complete systems conform to latest machine tool electrification and hydraulic standards. Van type hydraulic pumps are accessible in the column of the machine for ready inspection or service. Hydraulic system filters are removable for inspection and cleaning without need to stop the machine or drain the oil.

B-25—Eight-Inch Stroke Hydraulic Press

A 125-ton hydraulic press, new addition to the Duke line of presses, has just been brought out by Duke Engine Co., Grand Haven, Mich.

The new press, available either in hand-operated, air-operated, or electrically operated models, has been developed for use in tool and die shops, heat-treating plants, welding shops, and foundries, etc.

The new model has an 8-in. stroke with an additional 8-in. adjustment available by auxiliary screw-type ram.



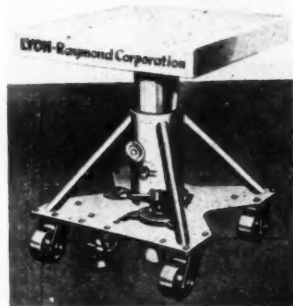
Duke 125-ton hydraulic press

Special frame sizes are also available. Air models are built to operate from either 90-lb or 145-lb air pressure.

Safety features include a by-pass relief valve to prevent over-extending the ram, and safety valves on the air and electric models to guard against overloading.

Width between the press uprights measures 48 in.; 12¼ in. between table channels.

B-26—Hydraulic Elevating Table



Lyon-Raymond 4000 lb hydraulic elevating table

The Lyon-Raymond Corp., Greene, N. Y., announces a new addition to its line of hydraulic elevating tables, the standard 4000 lb capacity model. The table is especially suited for die handling. Being portable, it can transfer dies between storage racks and presses. The elevating feature allows each die to be transferred at press bed or storage rack level.

This new table has a top 30 in. sq which revolves fully and locks in a fixed position. The top has a 14 in. range of elevation, the lowered height being 28 in. and the elevated height 42 in., controlled by a pedal release valve.

C-17—Light High-Stack Fork Truck

A featherweight fork truck in the Skylift series, designed to introduce modern materials handling science where it had been impossible or uneconomical before, has been introduced by the Automatic Transportation Co., Chicago, Ill.

The FF truck is made in 1000 and 1500-lb capacity models. The thousand-pounder designed for a 30-in. load weighs only 2360 lb, and when rated for a 48-in. load weighs 2623 lb. The 1500-lb model's weight is 2836 lb. Despite a collapsed height of 78 in., both models lift to 134 in., with "free" lift of 68 in. before the telescopic mechanism is extended.



Automatic featherweight fork truck, models FF

With a 30-in. load, the featherweight Skylift can stack at right angles in an aisle narrower than 8 ft, and a 48-in. load requires less than 10-ft wide aisle. The 1000-lb unit operates easily in 48-in. intersecting aisles.

The FF has a permanent two and a half degree tilt at the centering point, retracting the load over the wheels. This is said to be the equivalent of adding 25 lb of counterweight for each foot of lift, adding stability to the truck and making possible its light weight. Tilt while lifting is 10 deg backward and 5 deg forward, each measured from a point where the forks are horizontal.

Power is supplied by two standard



For additional information regarding any of these items, please use coupon on page 54.

Transporter batteries, enabling users of Automatic's Transporters to switch batteries. Motors and charging equipment also are interchangeable.

C-18—New Strong Paper Tape

A paper tape strong enough to compete with metal strapping and rope for heavy-duty packaging is made available nationally by the producer, Minnesota Mining and Mfg. Co., St. Paul, Minn.

With a tensile strength of 180 lb per in. of width, it is designated No. 320 in the "Scotch" brand industrial tape line, and is declared to eliminate packaging equipment and to save workmen cuts and similar injuries. The tape is thin (13-15 mils) and flexible. It has a pressure-sensitive adhesive which grips immediately upon contact.

Designed for use in packaging metal pipes, conduits, rods, rolls, sheets, coils, fittings and tubing, by wrapping it once around the load and back on itself, the tape is also expected to be used in the shipping of metal cabinets, window frames, doors, trim, raw lumber, etc. In addition, use of the tape is foreseen for packaging plastic sheets, tubing and rods, and in the shipment of plate glass, chains and miscellaneous assemblies.

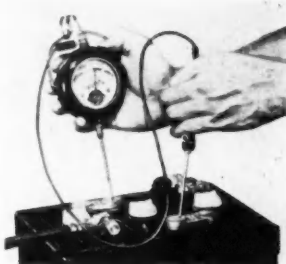
Strength of the tape is attributed in part to reinforcing the paper backing with threadlike fibers running lengthwise. The fibers, imbedded permanently in the adhesive, also are said to afford a tear resistance greater than can be measured by the ASTM-approved Elmendorf tear tester—greater than 1600 gram-centimeters.



No. 320 "Scotch" paper tape of Minnesota Mining & Mfg. Co.

C-19—Open-Circuit Battery Tester

A Chargerator (charge-indicator) for routine use in open-circuit voltage readings of car batteries is manufactured by the Hickok Electrical Instrument Co., Cleveland, Ohio, and is claimed to give reliable information on approaching battery failure by cell variation readings. With this instrument, state of charge is given in percent rather than in the specific gravity customary in hydrometer readings. Percentage readings are said to be more understandable to the car owner as warnings to recharge or replace batteries, the instrument thereby simplifying the servicing of batteries by service stations, car dealers, etc.



Hickok chargerator for routine open-circuit battery testing

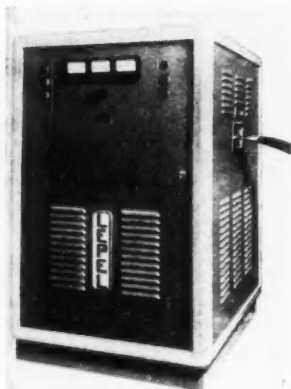
Reliability of the instrument is based on the theory that variations in open circuit voltage are directly proportional to variations in specific gravity. That is to say, OCV readings are proportional to the density of the electrolyte in the pores of the plate. Likewise, most batteries are found to show approaching failure by cell variation well in advance of actual failure. With this instrument, a variation limit of three scale divisions (60 points specific gravity) shown by a wide deflection of the meter needle, indicates a battery in trouble or with trouble imminent within 60 or 90 days, states the manufacturer.

This Hickok expanded-scale voltmeter has range of 1.5 to 2.8 with suppressed zero. The expansion is between 1.9 and 2.2 volts—about the operating range of automotive batteries. There is an expansion on the scale from 2.0 volts to 2.1. This voltage range of 1/10 of a volt represents a range in specific gravity of approx. 100 points. The 2.00 volt position represents about 1.160 gravity, and the 2.10 volt position 1.260 gravity. Also, 1/100th of a volt is the equivalent of 10 points of specific gravity. The value of a scale division in the operating range is 2/100th of a volt. One scale division is, therefore, the equivalent of 20 points of specific gravity two scale divisions, 40 points; three scale divisions, 60 points.

C-20—High-Frequency Heating Unit

Suitable for heating non-ferrous as well as ferrous materials to any desired temperature, a new Lepel vacuum-tube high-frequency heating unit is offered by Lepel High Frequency Laboratories, Inc., N.Y., N. Y. The machine can be used for hardening, soldering, brazing or melting.

The unit was engineered and designed by specialists in induction heating, and is claimed the latest development in electronic tube-type high-frequency equipment. The vacuum-tube machine, Lepel said, was developed as



Lepel vacuum-tube high-frequency heating unit

a companion machine to the recently announced spark-gap type heating unit for those who prefer to use the tube-type unit. The 20 kilowatt output of the tube machine, according to the manufacturer, is the same output as that of the spark-gap unit with 30 kilowatt input.

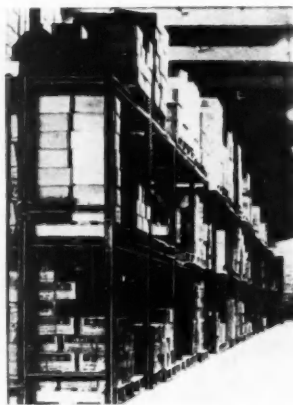
Housed in an all-steel cabinet, the unit has heavy-duty industrial type vacuum tubes, as well as grounded load coils, and permits use of flexible or rigid leads up to 8 ft in length. The machine consumes only one gallon of water per minute when idling, and less than five gallons at full load. The vacuum-tube unit is easily adjusted to any load, and requires no matching transformers or condensers.

C-21—Adjustable Pallet Racks

A new type portable adjustable rack for stacking materials loaded on pallets is offered by the Equipment Mfg. Co., Inc., Detroit, Mich. Constructed on the extension-post principle, the rack members comprise square tubular sections accommodating telescopic inserts in



For additional information regarding any of these items, please use coupon on page 54.



Equipment Mfg. Co.'s tubular adjustable pallet racks

their ends for easily making up the racks as desired, with rigidity a certainty. Base rack members similarly drop into short square tubes mounted integral with floor plates.

Offered in standard and heavy-duty models, the pallet racks assure orderly safe stacking of palletized materials of irregular shape and fragile character, each rack accommodating two loaded pallets with ample engineered clearances.

These racks permit high stacking to ceiling heights and consequent use of valuable "air rights" while permitting removal of individual pieces from any pallet at any time or of an entire pallet from any point in the stack. Order-picking lines are thereby shortened and a greater variety of reserve stock can be stored in any one bay with immediate access.

Racks are installed by spotting them in place with fork trucks. No welding or cutting is required in assembly. Rack levels can be raised or lowered by insertion or removal of extension posts.

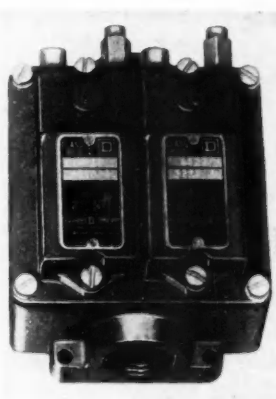
Load limit of standard 9-ft pallet racks is approx. 4000 lb, distributed load, using two pallets. Limit of heavy-duty racks is approx. double.

C-22—Two New Limit Switches

Two new duplex limit switches announced by the Square D Co., Milwaukee, Wis., enable machine designers to now use one switching unit, where two limit switches were needed. A single duplex switch can also be used to replace two separate limit switches on present machines or equipment.

By using two oiltight switches in a single duplex assembly, only one run of conduit is required for necessary control wires. Extra conduit and fittings between individual switches are eliminated.

Both surface mounting and flush



Duplex limit switch in oil tight surface mounting

mounting types are available. Each switch has a single pole, double throw snap action mechanism and two electrical circuits. One circuit is normally open and the other normally closed. The snap switch cases are made of melamine—a non-carbon-tracking plastic with superior electrical characteristics.

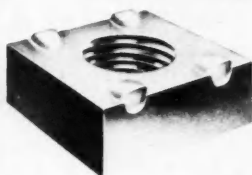
The flush mounting unit consists of two limit switch assemblies mounted on a square steel plate, provided with a mounting gasket. For surface mounting, a die-cast box is added, with 3/4-in. conduit openings on two opposite sides. The box can be attached so the conduit axis is either longitudinal or transverse with respect to the switch units. If desired, the switch units can be mounted so their actuators are at opposite ends of the box.

Switches are available with either two push rods, two plain roller arms or two one way rollers. Return springs can be readily changed for the reverse direction of operation. On roller arm types, removal of this spring provides maintained contact operation.

Switches are rated to 600 volts AC or DC, and will operate in temperatures up to 200 F. Single switch units are approximately 3 7/8-in. long by 1 1/2-in. wide by 3-in. high to top of roller arm.

C-23—Four-Projection Weld Nut

Of interest to automotive manufacturers and others who have assembly



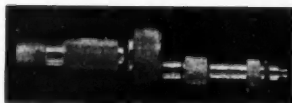
New weld nut with four up-set projections

problems is a new weld-nut being offered in unlimited quantities through two licensed manufacturers, the National Screw and Mfg. Co. and Lamson and Sessions, both of Cleveland, Ohio.

The new weld-nut is a standard square shape with four up-set projections on one face as shown in the illustration. It is used extensively for assembly work which has one inaccessible side, or where the use of weld-nuts is cheaper than the labor of applying nuts in the conventional manner.

C-24—Step-Up Handpiece

Applicable to all WYCO grinders, older as well as latest models, multiple and single speed, a new No. 1300 step-up handpiece multiplies the speed of any of these machines three times or better, according to the manufacturer, Wyzenbeek & Staff, Inc., Chicago, Ill. Using No. 1 to No. 5 shaft, and replacing the old standard handpiece, the new WYCO



WYCO No. 1300 step-up handpiece, applicable to all WYCO grinders, multiplies speed three times or better

by means of gear step-up, speeds the work to 5000 rpm or higher, with $\frac{1}{4}$ -in. mounted wheels—not only for carbide cutters but for rotary files, mounted grinding wheels, abrasive rolls, and many other applications. On standard 3600 rpm single speed grinders the operator is claimed now to get over 10,000 rpm, so that small mounted grinding wheels can be used at a much more satisfactory speed. Collets $\frac{1}{4}$ in. or $\frac{1}{2}$ in. fit this new handpiece. For carbide cutters the No. 1300 handpiece is said to be giving speeds up to 33,000 rpm.



For additional information regarding any of these items, please use coupon on page 54.

C-25—Four-Cylinder Air Compressors

Three new four-cylinder V type two-stage air-cooled compressors rating 7½, 10 and 15 hp respectively are be-



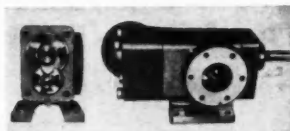
DeVilbiss V type 4 cylinder air compressor

ing put out by the DeVilbiss Co., Toledo, Ohio, to provide larger capacity outfits for stationary type installations. A highly developed two-stage principle employed in both banks of cylinders affords displacement in the 10-hp unit of 47.86 cfm at 175 psi. Similar displacement is attained in the 15-hp and 7½-hp models, all of which are available for 175 psi or 125 psi use.

The forged crankshaft is dynamically balanced. Forged connecting rods are provided with automotive type prefit bearings. Main bearings are frictionless ball type. Cylinder blocks and valve assemblies are removable.

C-26—Helical Rotor Pumps

The Syntro Co., Homer City, Pa., has released a line of positive displacement, extremely simple, helical rotor pumps, built in two sizes and primarily designed for handling various grades of oils in either 50 or 75 gpm, at pressures up to 125 psi in a smooth, pulseless flow.



Syntro positive displacement helical rotor pumps

Two helical rotors, one a driving rotor and the other an idler rotor, force the liquid ahead in an axial flow in volume and at pressure. The shaft of the driving rotor is mechanically sealed by a Syntro "Anti-Friction" shaft seal against leakage.

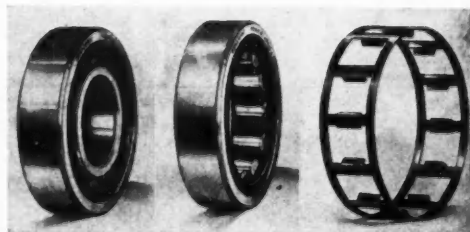
C-27—Separable-Race Roller Bearing

Rollway Bearing Co., Inc., Syracuse, N. Y., is manufacturing a precision cylindrical roller bearing having a self-contained roller assembly in an outer race, and an inner race that is separable.

Bearing components are the outer race with deep accurate ring grooves in the inside diameter into which fit the heavy snap rings that retain the roller retainer and rollers in the outer race. The one-piece steel retainer has pockets with deep, broad, double flanges which keep the rollers in alignment.

Rollway is said to have standardized on use of 4620 type nickel-molybdenum steel for rollers and races to assure minimum distortion during heat treatment and the desired balance between hardness of the case and toughness of the core.

"Tru-Rol" cylindrical roller bearings are offered in a range of sizes conforming with SAE standards. The BE-1200 and BE-1300 series correspond to the single row type of the 200 and 300 size respectively. The BE-5200 series corresponds to the wide type.



"Tru-Rol" Rollway bearing with separable inner race installed (left), roller retainer with rollers (middle), and roller retainer itself

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

A-30—Springs

Illinois Coil Spring Co.—A new Brief Guide for Spring Buyers contains useful, usable information; tells what a good spring is; shows at a glance the principal types of springs, what they are for—and many of the varieties common to each type. Diagrams and gives names commonly used to designate the various types of springs and spring ends.

A-31—Die and Wear Parts

The Metal Carbides Corp.—An announcement has been made of the publication of a new, revised Die and Wear Parts catalog, No. 48-WP. The 36-page catalog contains full prices and particulars on Talide-tipped centerless grinder blades, sheet metal draw dies, wire and tube dies, drill jig bushings, gages and solid carbide bars, tubes and wear strips. Engineering data and design data are included.

A-32—Koroseal Sheet Lining

Metalweld, Inc.—A new four-page bulletin on Koroseal Sheet Lining as used to protect chemical, acid and plating tanks contains factual information

about application, corrosion resistance and effects of temperature. Extensive chemical resistance tables are also featured.

A-33—In-Line Valves

Ross Operating Valve Co.—Booklet No. 311, a new 12-page illustrated bulletin on Full-Flo, In-line Valves describes and diagrams large and small three-way and straightway valves. The large are solenoid air-pilot operated and the small are direct solenoid operated. They are suitable for machine tools, jigs and fixtures. Applications for use with water and low air pressures are also described and typical installation diagrams are included.

A-34—Batteries

The Electric Storage Battery Co.—Exide Manhex Batteries in sealed glass are described and illustrated in a new eight-page folder. The text and illustrations tell about the design and construction of the battery.

A-35—Thermocouple and Pyrometer Accessories

The Bristol Co.—A new thermocouple

and pyrometer accessories bulletin, No. P1238, contains 56 pages of detailed information on thermocouples, protection tubes and other pyrometer accessories. A technical section contains engineering handbook data on such subject factors affecting thermocouple life, corrosion and poisoning, etc.

A-36—Cut-Off Wheels

The Allison Co.—Three new bulletins have been announced covering Rubber Bonded Abrasive Cut-Off Wheels, Resinoid Bonded Cut-Off Wheels, Rubber Bonded Polishing Wheels and Ball Race Grinding Wheels. Data includes specifications and information on each type of wheel, including materials and operations on which they are used, general recommendations, as well as information for ordering.

A-37—Hydraulic Cylinders

Gerotor May Corp.—A new hydraulic cylinder catalog, Section No. 103, illustrates and describes all standard cylinders, with complete diagrams and information to aid in laying out circuits. Engineering data in the new catalog includes displacements and theoretical forces for cylinders both in standard and 2 to 1 rod.

A-38—Milling Machines

Cincinnati Milling and Grinding Machines, Inc.—Catalog M-1662 combines information in one catalog on the 2ML and 2MI Milling Machines. The two-color catalog is well illustrated, contains design highlights, construction details (Turn to page 78, please)

TIME SAVER COUPON for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above **OR New Production and Plant Equipment OR New Products** items described on other pages.

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Business Machines are made from
J & L cold-finished JALCASE STEEL...

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...the original, free-machining, cold-finished open-hearth steel... for better quality precision parts at lower cost.

Look inside a business machine of any leading make, and most likely you'll be looking at a mass of precision parts accurately machined from J&L cold-finished *Jalcase* Steel. To the uninitiated, the "brains" of these modern marvels appear like an insolvable maze, but every tiny gear, lever and cam has a definite job to do—a definite function to perform for rigid accuracy.

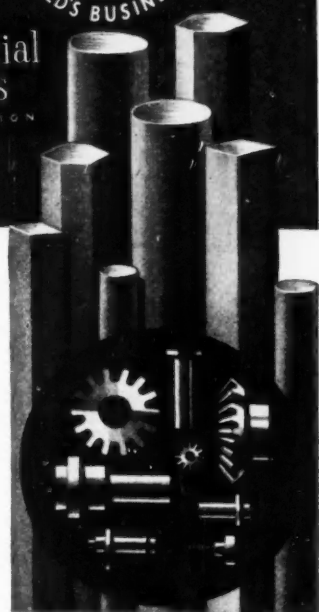
There are some sound business reasons why so many of these working parts are made from J&L *Jalcase*—the original, free-cutting, open-hearth steel:

● *Jalcase* is the leading free-cutting steel—and has been for more than 25 years.

- It machines smoothly and easily at high speeds.
- It lengthens tool life and reduces the number of stops for re-tooling.
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- Ten grades plus a number of special treatments offer the *Jalcase* user a wide range of desirable properties.

If you machine steel in the manufacture of your products—investigate *Jalcase*!

We have just published a new brochure on cold-finished *Jalcase*, and shall be glad to send a copy to anyone interested in machining rod and bar stock. The coupon at the right is for your convenience.



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JONES & LAUGHLIN STEEL CORPORATION

PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Dana Corp.—**C. A. Dana**, president, was elected chairman of the board and **R. E. Carpenter**, formerly executive vice-president, succeeds Mr. Dana as president of the corporation. **J. V. Melick**, formerly secretary-treasurer, was elected vice-president and secretary. **L. L. Melick**, assistant secretary and assistant treasurer, was elected treasurer and assistant secretary. **William Fairhurst** was re-appointed vice-president. **Walter J. Hoshall** was named assistant treasurer and assistant secretary; **B. F. Bogart**, assistant treasurer and **E. M. Kreckler**, assistant treasurer.

Niles-Bement-Pond Co.—The appointment of **Harry Reichert** as Acting Manager of Foreign Sales of the company has been announced.

Ford Motor Co.—**Herbert E. Holls** has been promoted to sales office manager of the Buffalo office.

Ford Motor Co. — Lincoln Mercury Div. **John L. Hasebrook** has been appointed resident controller of the Div. He replaces **E. A. Ulbrich**, who has been appointed to the Central Controller's staff of the Ford Motor Co. at Dearborn.

General Motors Corp., Harrison Radiator Div.—Consolidation of the product engineering and research engineering departments has been announced. **Laurence P. Saunders**, chief engineer of the research engineering dept. has been transferred to technical assistant to the general manager. **J. Ralph Holmes** was transferred from chief engineer of the product engineering dept. to chief engineer of the consolidated dept.

General Motors Corp., Delco Application Div.—**Harold H. Leonard** has been appointed to the position of Equipment Div. Sales Manager. **Carl T. Amrine** has been made Asst. Sales Manager of the Equipment Div.

General Motors Corp., Pontiac Motor Div.—**E. J. Chapman** has been appointed regional manager of the division, with headquarters at Pontiac, Michigan.

The Glenn L. Martin Co.—Appointment of **Paul E. Hovgard** as project engineer for all current flying boat projects has been announced.

Aircraft Industries Assoc. of America, Inc.—**Agnew E. Larsen**, Manager of the Rotawings Div., Glenn Martin Co., has been elected chairman of the Helicopter Council.

Aviation Maintenance Corp.—**John W. Thorp** has been appointed chief engineer.

Westinghouse Electric Corp. — Dr.

William E. Shoupp was named Director of Research and **Robert A. Bowman** was appointed manager of engineering in the new Atomic Power Division of the company.

Plymouth Motor Corp.—**M. L. Vandagens** has been appointed technical service manager.

Ammco Tools, Inc. — **Frederick G. Wacker, Jr.** has been elected president and **Charles H. Wacker, III**, has been elected executive vice-president.

Eaton Manufacturing Co., Heater Div.—**Frank Edwards** has been promoted to the position of Sales Manager.

Plomb Tool Co.—**A. L. Hawley**, formerly assistant works manager, has been appointed works manager of the main factory in Los Angeles.

Federal-Mogul Corp.—Four new vice-presidencies have been created—**M. A. Hunter** is in charge of manufacturing, and also serves on the board of directors. **Ernest R. Darby** is in charge of research. **Rogers I. Marquis** is in charge of industrial relations. **Neil A. Moore** is in charge of the company's service division.

Resistance Welder Manufacturers' Assoc.—**B. L. Wise**, Director of Production, National Electric Welding Machines Co., has been elected president of the association.

Crosley Motors, Inc. — **Howard R. Wunker** has been appointed regional sales manager.

American Wheelabrator & Equipment Corp.—**Otto A. Pfaff**, President, has been elected to the board of directors of Signode Steel Strapping Co.

The B. F. Goodrich Co.—**Dr. William Lee Davidson** has been named director of the company's physical research department. **Glenn E. Martin** has been named manager of sales planning and **Jay E. Miller** has been appointed to a newly created post, western public relations manager.

R. G. LeTourneau, Inc. — **Hans A. Bohuslav** has been appointed chief engineer in charge of engine construction.

Seovill Manufacturing Co., Inc.—**R. L. deBrauwere** was elected assistant vice-president.

Great Lakes Steel Corp.—**W. R. Cunningham** has been appointed vice-president and general manager of sales.

Elastic Stop Nut Corp.—**Kenneth D. Davis** has been appointed manager of the Ensmail Sales Div.

The Asbestos Textile Institute has elected **George S. Fabel** as president.

Metal Products Corp.—**Harold C. Norman** has been named vice-president in charge of sales.

The Magnesium Assoc.—The appointment of **R. B. Brown**, as executive vice-president of the association has been announced.

American Steel & Wire Co.—**Raymond E. Tibbets** has been named division supt. of the spring mill and rail bond div. **Harold J. Elmendorf** has been appointed chief spring engineer, and **E. R. Karlson** has been made division supervisor—production planning.

Collins & Aikman Corp.—**Albert R. Jube** has been elected president.

American Brake Shoe Co., American Brakeblok Div.—**Maynard B. Terry** has been appointed vice-president of the division.

Devoe & Reynolds Co., Inc.—**Roscoe Hall Sawyer** has been named assistant chemical director.

Seiberling Rubber Co.—**Jack Lotze** has been named merchandising manager. **John H. Fogarty** has been promoted to advertising manager, succeeding **E. B. Spoonamore**, resigned.

Electric Storage Battery Co.—The appointment of **John P. Casserly** as supervisor Exide Automotive Manufacturers' Sales has been announced.

Shell Oil Co., Inc.—**Joseph S. Harris** has been appointed head of the Aviation department to succeed **Dr. R. T. Goodwin**, who is now manager of the company's special products department.

Necrology

Lewis E. Reisner, 46, one of the founders of the Kreidner-Reisner Aircraft Corp., which later became the Fairchild Aircraft Corp., and who later formed the Tennessee Aviation Co., died on Jan. 9 in Nashville, Tenn.

Harry E. Schank, 58, chief engineer of the McCord Corp. and a leading authority on automobile engine cooling, died recently.

Dr. George Jackson Mead, 57, co-founder of the Pratt & Whitney Aircraft Co., now a division of the United Aircraft Co., and a leading designer of aircraft engines, died on January 20 in West Hartford, Conn.

H. G. Chandler, vice-president in charge of sales, United Specialties Co., died on Jan. 1, 1949.

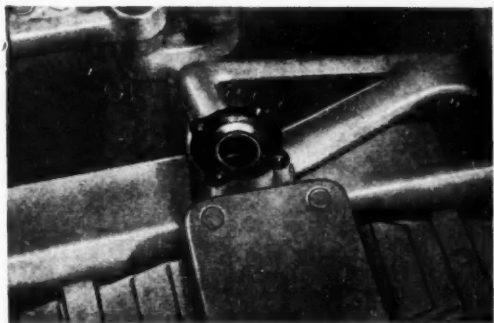
Torrington Needle Bearings

Keep Upkeep Down

in "Caterpillar" Diesel Tractors



Heavy farm chores and tough construction jobs are a matter of course for "Caterpillar" Diesel DW10 Tractors. One feature owners like is a rugged design needing little upkeep. In governor, brake pivot shaft, steering gear and steering bellcrank, long service life is secured with efficient Torrington Needle Bearings.



The bellcrank application in steering control shows how these high-capacity, anti-friction units fit into compact designs. Two Needle Bearings mounted with close fits keep mating parts in alignment. Freedom from wear maintains close bearing clearances and eliminates the need for readjustment.



Related parts of the assembly are simple—a plain machined bore for a housing, a hardened and ground shaft for an inner race. Fabrication is easy, and installation a quick arbor press operation. No retaining devices are needed. Such Needle Bearing features help keep manufacturing costs down.

Machinery you build or operate can be improved in operation and service life with Torrington Needle Bearings. Consult our engineers on your specific application requirements. THE TORRINGTON COMPANY, Torrington, Conn. or South Bend 21, Ind. District offices and distributors in principal cities.



TORRINGTON NEEDLE BEARINGS

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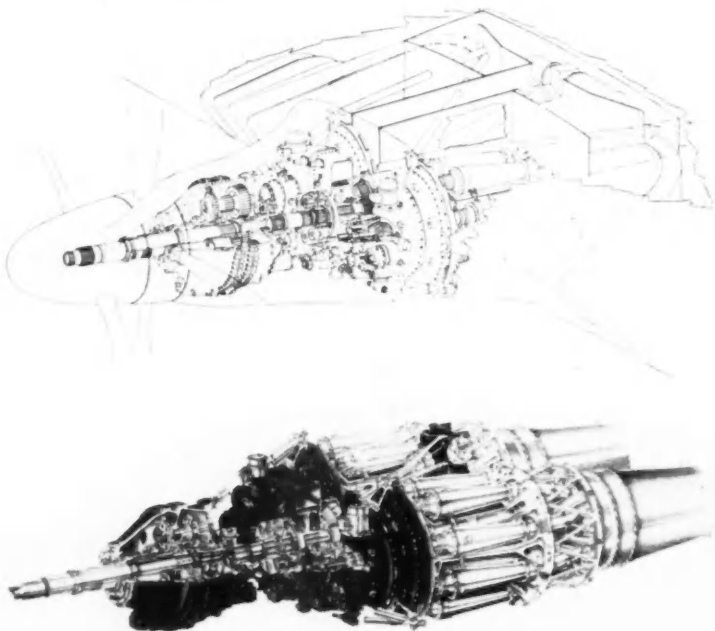
Straight Roller • Ball • Needle Rollers

Kerosene-Burning Tractor

Known as the Nuffield, this tractor featuring a kerosene-burning L-head engine has been placed in production by the Morris company at the Walseley Motors factory in England. It is equipped with a variable rear tread and either single or dual steering wheel, and is designed to take Ford implements. The engine develops 42 hp at 2000 rpm.



Coupled Turbine Engines



These cutaway and line drawings show how two Bristol Proteus propeller-turbine engines will be coupled together for powering 145-ton Brabazon II airliners and Saunderson SR/45 flying boats. The Brabazon will be equipped with eight Proteus engines coupled in pairs while the Saunders-Roe flying boat now under construction in England will have 10 Proteus engines in four coupled pairs and two single units. At present the Bristol Company is building the Brabazon I prototype which will be powered by eight piston-type engines. A Proteus propeller-turbine engine is rated at 3200 hp and 800 lb thrust at 10,000 rpm.

SNYDER

MACHINE FOR BORING BIG FORGINGS

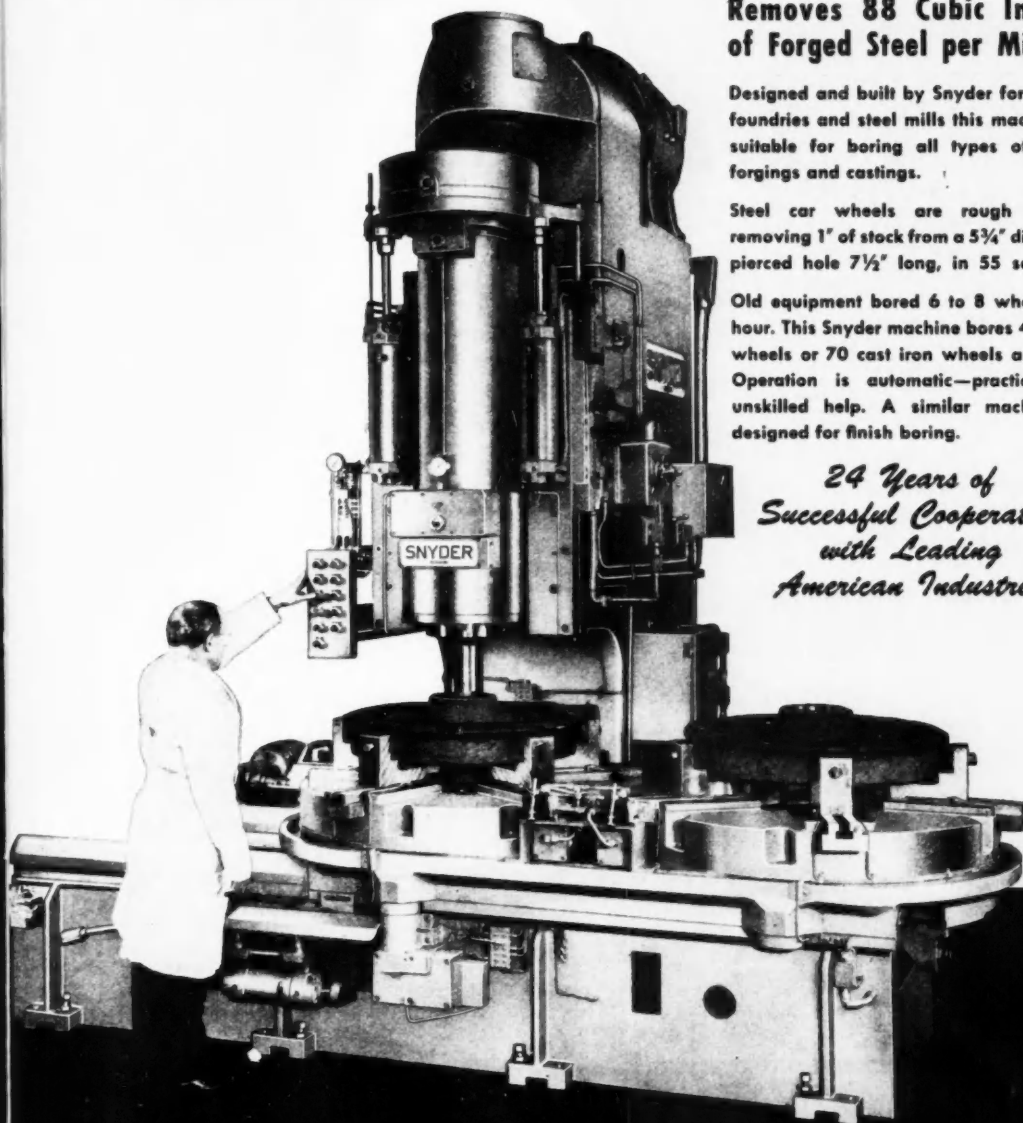
**Removes 88 Cubic Inches
of Forged Steel per Minute**

Designed and built by Snyder for use in foundries and steel mills this machine is suitable for boring all types of large forgings and castings.

Steel car wheels are rough bored, removing 1" of stock from a 5½" diameter pierced hole 7½" long, in 55 seconds.

Old equipment bored 6 to 8 wheels an hour. This Snyder machine bors 40 steel wheels or 70 cast iron wheels an hour. Operation is automatic—practical for unskilled help. A similar machine is designed for finish boring.

*24 Years of
Successful Cooperation
with Leading
American Industries*



SNYDER TOOL & ENGINEERING CO.

3400 E. LAFAYETTE, DETROIT 7, MICHIGAN

1949 Plymouth and Dodge Cars

(Continued from page 39)

new chassis frames for all models. They remain basically of the same type as before but contain features necessary to accommodate the relocated running gear elements.

Taken as a whole, the basic mechanical design and specification features remain the same for all engines in the line. However, horsepower has been stepped up moderately in all engines in various ways. Compression ratio is upped to 7.0 to 1 on all engines except the Chrysler Eight, the latter being

7.25 to 1. This has brought with it new cylinder heads, and on several models changes in combustion chamber form to provide better mechanical clearance for the valves. In addition, the engines have been fitted with new intake manifolds to provide better breathing. On at least several engines Chrysler has added new camshafts with high lift cams. An automatic choke has been added to the Plymouth engine.

The ignition system has been improved by the adoption of the new

waterproof type distributor which also includes a built-in 10,000 ohm resistor. The new heavy duty coil is mounted on the engine to permit use of an extremely short high tension lead to the distributor. These changes reduce radio and television interference. Particular attention has been given to all elements of the ignition system and wiring harness to reduce leakage and corona effects. Ignition cables are coated with neoprene to prevent leakage and protect against water. Plymouth will have a 40-amp generator instead of the 35-amp unit previously used and also will have a 4½ in. starter instead of 4 in. It will be equipped with an automatic choke as standard equipment for the first time. De Soto is expected to announce adoption of a higher output generator to cope with the increased electrical load common in modern cars. Another minor feature of interest is the new ignition switch which also combines the function of a starter switch. The ignition key is first turned to "on" position, then as it is turned a little farther to the right it acts as the starter switch. When the engine starts the key returns to the "on" position.

Speculation has been rife concerning the wide adoption of cycle-welded bonded brake linings. While it has been known that Chrysler has supplied bonded linings on many of the truck models and to some extent on passenger cars, there has been no official confirmation of this. We learn now that before long all passenger cars will have bonded linings. At the present moment only De Soto is said to be supplied 100 per cent. The only bar to the use of bonded linings across the board so far as we can learn, is the need for more extensive production facilities and these will be available before long.

The semi-automatic transmission now incorporates some refinements designed to further simplify the mechanism as well as to improve operation. Among these changes is the adoption of poppet valves for hydraulic controls. Another new feature is a major design change in the main hydraulic pump. While it remains of gerotor type, it is now installed around the mainshaft from which it is directly driven, thus eliminating the former gear drive.

Coming to bodies, it is of great interest to learn that while there is complete similarity of line, form and basic construction in all models, the high production Plymouth line has its own smaller version bodies to suit the shorter wheelbase. All of the other lines effect a major interchangeability of body stampings in the interest of cost economy and primarily to reduce the burden on dies and tooling.

Another worthwhile feature of the bodies is that the toe board for rear seat passengers is fixed to the floor, hence does not move with the front seat, thus giving the rear seat passengers a firm foot rest and constant clearance.

(Turn to page 62, please)



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SOLVENT Vapor DEGREASER



Write today for FREE booklet on Degreasers and applications with Blacosolv the all-purpose degreasing solvent.

Special jobs and difficult jobs are easily handled in Blakeslee Solvent Vapor Degreasers. The inside of tubing up to 40 feet long with a diameter as low as ⅜ inch may be thoroughly cleaned and dried.

Blakeslee Degreasers insure cleaning of all surfaces, cracks, spot welded seams; preventing bleeding of oil from hidden surfaces. This complete cleaning eliminates carry over of oils and greases to acid and plating tanks, and does away with rejects resulting from inferior cleaning methods. Removal of polishing and buffing compounds is another perfect application of Blakeslee Degreasers.

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*Serving the Majority of the Most Discerning
Accounts in the Automotive Industry
for Over 25 Years*

STERLING ALUMINUM PRODUCTS, INC.



ST. LOUIS, MO.

The Chrysler models have a particularly tasteful treatment of the instrument panel. All of the instruments are grouped within an ingeniously designed cluster directly in line with the steering wheel and made a part of the panel. The rest of the instrument panel to the right of the edge of the steering wheel is recessed for other controls. The upper section of this panel can be truly termed a "safety pad" or crash pad since it consists of a colorful covering over a rubber pad. If a right front seat passenger is thrown forward in case of road accident he will contact the pad first. Another safety feature worthy of note is

that with the increase in windshield glass area, the sweep of windshield wiper area has been correspondingly increased.

Door handles have not been changed, being the turn-down type rather than pull out or trigger style. An innovation this year is a fast action screw turn-lock on the window ventilator catch, which prevents it being unlatched by inserting a wire from the outside. Another improvement is a new gearing in the window control regulator, which reduces the number of complete turns to raise or lower the window by one-third to one-half.

New Federal Trucks

(Continued from page 39)

the JXEF engine, rated 91 hp at 3100 rpm, with Delco Remy electrical equipment, including a 30 amp, 240 watt generator, and full automatic ignition. The clutch is Borg & Beck, 11-in., single plate. A Carter 1½ in. down-draft carburetor with oil bath cleaner is standard.

The rear axle is a Timken Model 33547DPH of split housing type with single speed, spiral bevel gear drive, and a 67 in. track. Standard gear reduction is 5.67 to 1, optional ratio is 6.67 to 1. A two-speed rear axle—Timken Model E-300—is available as optional equipment in the 1½ to 2 ton range. It has a gear ratio of 6.13 to 1 in high range, 8.40 to 1 in low range.

The frame is of large size—89/16 by 27½ channel section. Auxiliary springs are optional and larger capacity main springs are offered at extra cost, if desired. The standard transmission is Warner Model T9 with four forward speeds. An optional five-speed transmission also is offered. Steering gear is the Gemmer Model 335, of triple tooth roller type, with 18-in. steering wheel.

Standard brake equipment consists of the Lockheed hydraulic system at the front with 14 by 2 in. shoes. The rear brake system is the Timken DP hydraulic system with 16¼ by 3 in. shoes. The Hydrovac vacuum booster is offered as optional equipment. However, where tire equipment of 7.20 or over is specified, the Hydrovac booster and auxiliary rear springs are installed as standard equipment.

A feature of interest is that the Federal deluxe cab with its special items of equipment is supplied as standard on the new model.

GUNITE RIBBED • HEAVY DUTY BRAKE DRUMS



THE REAL REASON FOR RIBS...

Brake drums in heavy duty service are subject to severe flexing stresses imposed by the pressures of the shoes, tending to stretch the drum out of shape; and high temperatures, sometimes running to over 1000°. The characteristic ribs on GUNITE Brake Drums look like cooling fins but are not. Their purpose is (1) to stiffen the drum and hold it in shape against the shoe pressures, (2) to permit the use of thinner sections and thus reduce internal compressive and tensile stresses that produce "heat check", and (3) to permit axial expansion of the braking surface at high temperatures, further tending to prevent heat check and breakage. The GUNITE rib design was developed by hundreds of gruelling over-the-road tests and its effectiveness has been demonstrated by a thousand million miles of silent proof. Buy RIBBED Gunites for heavy duty braking!

Write for our new folder giving further information on the advantages of ribbed drums.



BOOKS...

GAS TABLES by Keenan and Kaye, 238 pp., published by John Wiley & Sons, Inc. This new book by Joseph H. Keenan and Joseph Kaye, respectively, professor and assistant professor of mechanical engineering at Massachusetts Institute of Technology is intended to provide an authoritative source of information for the calculation of engineering problems involving air, and is particularly valuable to those concerned with the design of gas turbines and the study of heat and power plants in general. The text replaces an earlier book by the same authors—"Thermodynamic Properties of Air" these properties having been re-examined and recalculated. Properties of combustion products of hydrocarbons and their constituent gases have been added and tables for analysis of flow of compressible fluids have been extended. It is noted that some of the most valuable portions of the latter material, prepared by Shapiro and Edelman have not appeared before except in reports of limited circulation. In addition to the 64 formal tables, the book includes a section dealing with sources and methods, solution of selected examples, and bibliography.

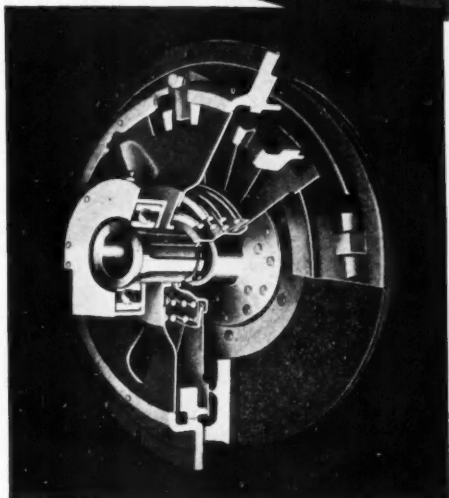


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transmission in the Spicer
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SPICER "BROWN-LIPE" GEAR BOXES • RAILWAY GENERATOR DRIVES

SAE Annual Meeting

(Continued from page 47)

Copper members rotate in pools of mercury, which gives dependable performance up to 3000 rpm when mercury splashing becomes excessive. A Baldwin-Southwark strain indicator measures the output of the gages.

Ford's Experience with Hot Extrusion Method

Claud L. Stevens, quality control supervisor, and Gustav Vennerholm, metallurgist, Ford Motor Co., gave a progress report on the hot extrusion

method adopted last year for making Ford car front spindles, which are now in production at the Canton and Rouge plants. In comparison with the former forging method, savings amount to 30 per cent in the cost of steel, a capital investment of 20 machines, 65 per cent in labor, a floor space of 80 per cent, die costs of 40 per cent, and in addition an undetermined saving in equipment maintenance, improved working conditions, and a better product, according to their summary.

Tests disclose that the average fatigue life of the extruded spindle is 17 per cent greater than that of the forged spindle. Test results are shown in Fig. 7. The test spindles were made of SAE 5130 steel and heat treated by quenching from 1500 F into a caustic solution, from which they were removed at 400 F to 600 F and drawn to a Brinell Hardness of 302-341.

Die life is a major problem in using the hot extrusion method. The most successful die material found by Ford to date contains C .30-.35, Mn .25-.60, Si .80-1.20, Cr 4.75-5.50, W 1.0-1.5, and Mo 1.4-1.8. Dies of this metal, which are heat treated to about 50 R., will produce 6000 to 9000 extrusions in a press operating at 30 strokes per minute.

Ford has under consideration the following forgings for hot extrusion application — transmission main shaft gear, rear axle driving pinion and rear axle shaft.

Conservation and proper utilization of America's fuel resources was the main theme of a paper given by R. J. S. Pigott, chief engineer of the Gulf Research & Development Co. and retiring president of the SAE. He warned of the need of supplementing petroleum production with other sources in 10 to 20 years and advocated that shale oil and synthetics from coal, which have been under development for the past 25 years and have reached a possible production state, should receive the major effort, paralleled by development of synthetics from vegetable waste, such as wood, with a reforestation program worked up to assume a permanent supply.

L. C. Goad, General Motors vice president and group executive in charge of Fisher Body, Ternstedt and Buick-Oldsmobile - Pontiac Assembly divisions, foresees much greater individuality in design and styling in passenger cars when the buyers' market and competition returns.

Tool-building he said, is a large operation within the Fisher Body organization, consisting of nearly 4000 employees engaged in designing, constructing, and trying-out production tools. This group designs practically all of Fisher Body tooling and builds almost 75 per cent of the tooling equipment for its six fabricating plants and 14 assembly plants, and also for the six plants of the B-O-P Assembly Division.

In his discussion of forging high temperature alloys, particularly for gas turbines for aircraft and locomotive use, L. S. Fulton of Universal Cyclops Steel Corp. emphasized that the most important and by far the most difficult forging operation is the fabrication of turbine buckets since they are made of highly alloyed metals and the design of their blades requires many operations. Root sections are either upset or extruded, after which they are forged in repeated operations under small hammers. Most commonly used bucket ma-

(Turn to page 67, please)

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- Single and Multi-Spindle Honing
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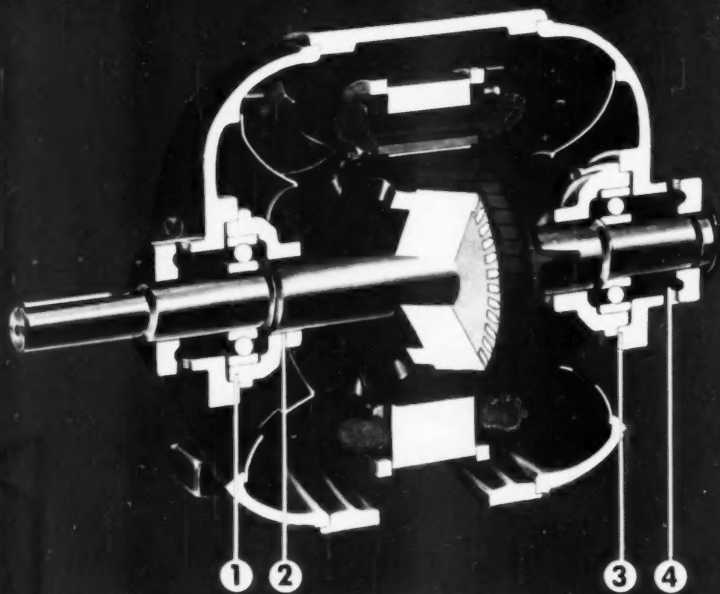
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**YOU CAN'T BEAT A
TRI CLAD MOTOR FOR
EASY MAINTENANCE**

GENERAL  ELECTRIC

**HERE'S
WHY**



Notice (1) how Tri-Clad bearings are surrounded by and rigidly supported in solid cast-iron housings. Compare the long, close-running fit between housing and shaft (2) with other motor bearings. Examine the tight rabbit fit between inner cap and end shield (3) which keeps dust and moisture out and lubricant in. See, too, the pressure-relief greasing system (4) that makes it easy to lubricate if you need to.

You can't beat a **TRI CLAD** motor for easy maintenance

A **TRI-CLAD MOTOR** will run safely without lubrication for years—for as long as any other general-purpose motor you can buy. The big thing is—it's *grease-gun easy* to lubricate a Tri-Clad if you need to.

You don't have to take a Tri-Clad motor down and disassemble the bearings to lubricate it. You don't have to follow special instructions. A standard gun and a good grease are all you need.

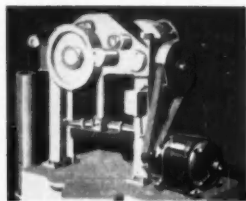
And remember, Tri-Clad gives you all the extra protection that only cast-iron structure can give . . . Extra protection against rust and corrosion . . . Extra protection against mechanical abuse and permanent distortion . . .

Extra protection that has been proved in more than 5 billion hours of rough-and-tumble industrial service.

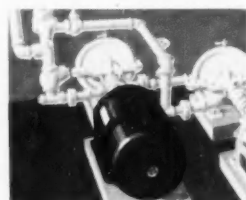
WANT TO SEE FOR YOURSELF? Tri-Clad motors in nearly all types and ratings are ready for **IMMEDIATE SHIPMENT**. Contact your nearest G-E Office or write Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

GENERAL  ELECTRIC

There's a Tri-Clad motor for every industrial need!



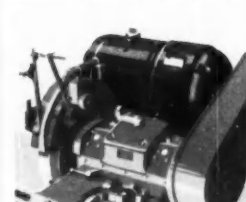
G-E open (dripproof) induction motors for constant-load, constant-speed applications. From 1 to 2000 hp.



G-E totally enclosed motors for operation where dust or corrosive fumes are a hazard. From 1 to 1000 hp.



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G-E Type ACA induction motors for adjustable speeds—provide 3 to 1 speed range. From 3 to 200 hp.

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PROTECTION

terial at the present time is a cobalt base alloy—S-816. Other alloys in use include Timken, 19-9-DI, N-155, Inconel X and Hastelloy B and C.

Gas Turbine for Trucks

S. D. Hage, propulsion development unit chief, Boeing Airplane Co., provided the engineers with a detailed description and data on performance of the small gas turbine developed at Boeing. An investigation is now being made to determine its possibilities as a truck engine. Without accessories, the weight of the Boeing turbine is approximately 150 lb and its power output ranges from 100 hp to 200 hp, depending upon the endurance life expected. Specific fuel consumption varies between 1.5 and 1.0 lb/bhp-hr.

Principal components are a centrifugal compressor, two constant pressure burners, a compressor driving turbine wheel or primary stage, which has a rated speed of 36,000 rpm and also drives the accessories, and a power output turbine wheel, with a rated speed of 24,000 rpm. The latter drives into a 9.6 to 1 reduction gear to give an output speed of 2500 rpm. Speed of the primary stage is entirely regulated by fuel flow and the secondary stage by the load. It can be accelerated from an idle speed of 10,000 rpm to full speed in five seconds.

Greater Utility in Personal Aircraft

A comprehensive analysis of the problems confronting the personal aircraft industry was given by Herb Randon, assistant chief engineer of the Beech Aircraft Corp. Accepting that considerable progress has been made in the development of personal aircraft, he believes that substantial further improvement in their utility, safety and convenience is necessary to attract large numbers to owning this equipment. Today farmers and doctors are the high ranking users of personal airplanes and among the others are salesmen, owners of small business, mechanics, aircraft factory workers, and large numbers of individuals of miscellaneous classifications. The oil industry is one of the largest industrial users.

"Today's Picture in Helicopters," the subject of the paper by R. H. Prewitt, president of the Prewitt Aircraft Co., encompassed a survey of 73 helicopter models, which have either been announced during the past two years or are currently under development. Fifty-two of them are American designs and the other 21 foreign designs. They range from a single place motorcycle size, 35 hp machine to a helicopter having a load carrying capacity of a standard rail coach. With speeds of airliners increasing, Mr. Prewitt believes that the helicopter will have in the future an important part in short haul air transport in addition to its present applications in military operations, crop dusting, insect control, seeding, airmail transport, and rescue missions.

New Rust Preventive Wrapper

A new rust preventive wrapper, produced by the Nox-Rust Chemical Corp., Chicago, Ill., eliminates coating of iron and steel products with the usual liquid or grease rust preventives. Slow vaporization of a synthetic chemical contained in the wrapper completely surrounds the part with a vapor sheath and prevents all corrosive action of both moisture and air. The wrapper need not be sealed or even tightly wrapped to give this protection; nor is it necessary for the wrapper to come into contact with the part. Even presence of moisture and water within the

package will not cause corrosion, it is said, because the chemical vapor mixes with the moisture and renders it harmless. Cycling humidity and temperature changes have no corrosive effect either when the Nox-Rust vapor wrapper protect the part, it is stated.

Nox-Rust wrapper itself is an essentially neutral paper. Vapor arising from it is odorless, non-toxic and is not injurious to the skin. The chemical is very stable and is not consumed in preventing corrosion; offers little tendency to escape when not sealed, and therefore lasts indefinitely.



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This cast iron valve plate for a refrigeration unit is finished on a double surface Microflat Machine to 8-microinch r.m.s. finish—optically flat and both sides parallel within 0.0001-inch. Production rate is 20 pieces per minute.

FINISH flat surfaces, on any material from soft copper to quartz or nitralloy, regardless of the shape or size of the part, in high production. Opposite sides of one or many parts are finished simultaneously on double surface machines,—productively produced to one light band of flatness and within one microinch r.m.s. surface finish. Recessed surfaces may also be finished on single surface machines.

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New Dip Compound for Corrosion Resisting Surfaces

United Chromium, Inc., New York, N.Y., has developed Unichrome dip compound 95, used to produce corrosion-resisting, conversion coatings on hot dipped zinc, plated zinc, and zinc die castings. Depending on the degree to which compound 95 is diluted, one of the following finishes is produced: 1) on zinc plate, a clear bright finish that looks like chromium or an olive drab finish; 2) on zinc die castings, a clear, bluish finish or an olive drab one; 3) on hot dipped zinc, a bright spangled finish or an olive drab one; 4) on all zinc, a coating which serves as an excellent base for paint, lacquer, or enamel.

The process is said to be especially good for finishing wire goods, small parts, and parts on which it is economically impossible to deposit enough copper, nickel, and chromium to provide the necessary corrosion resistance. Parts being processed in the olive drab finish include die cast automotive fuel pumps and carburetor bodies.

CALENDAR

Conventions and Meetings

Amer. Inst. of Electrical Engineers, Gen'l Mtg., New York	Jan. 31-Feb. 4
1st Internatl. Auto. Show, New York City	Feb. 5-10
Automotive Access. Mfrs. Annual Expos., New York City	Feb. 7-11
Amer. Soc. for Testing Materials Annual Spring Mtg., Chicago	Feb. 28-Mar. 4
Amer. Soc. of Training Directors, Cleveland	Mar. 3-5
SAE Passenger Car, Body, Prod. Mfg., Detroit	Mar. 8-10
Amer. Soc. of Tool Engineers Annual Mtg., Pittsburgh	Mar. 10-12
Chicago Technical Soc. Council, Annual Production Show, Chicago	Mar. 14-17
SAE Transportation Mtg., Cleveland	Mar. 28-30
Amer. Inst. Elec. Eng. Conf., Buffalo	April 11-12
Amer. Soc. of Lubrication Eng. Annual Show & Convention, New York	April 11-13
Metal Powder Assoc. Annual Mtg. & Exhibit, Chicago	April 5-6
SAE Aeronautic Mtg., New York City	April 11-13
Amer. Soc. of Metals, Western Metal Congress, Los Angeles	April 11-16
Midwest Power Conference, Annual Meeting, Chicago	April 18-20
Salon International Del'Aeronautique, Paris	April 29-May 15
Chamber of Commerce of the United States Annual Mtg., Washington	May 2-5
Amer. Management Assoc. Nat'l. Packaging Exp., Atlantic City	May 10-13
Instrument Soc. of America, Annual Mtg., Toronto, Can.	May 12-13
Soc. for Experimental Stress Analysis Mtg., Detroit	May 19-21
Middle Atlantic Regional Automotive Show, Phila.	May 23-30
SAE Summer Mtg. French Lick	June 5-10
American Inst. of Elec. Engineers Swampscott, Mass.	June 20-24
Amer. Soc. for Testing Materials Annual Mtg., Atlantic City	June 27-July 1
Amer. Electroplater's Soc. Annual Convention, Milwaukee	June 27-30
SAE West Coast Mtg., Portland, Ore.	Aug. 17-19
Instrument Soc. of America Convention, St. Louis	Sept. 12-16

For BETTER PARTS
to meet needs like these:

- Excluding dirt, grit, dust
- Retaining lubricants
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- Grinding, polishing, etc.
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Improved performance and greater functional dependability are achieved by many types of cut parts—processed from Western Felt. It's an extremely versatile material that offers unusual characteristics—including resiliency, flexibility and compressibility—plus high resistance to water, oil, age and heat. Western Felt, engineered to specific needs, cuts easily to any form . . . and does not ravel, fray or lose its shape. *New applications are found daily.*

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LARGEST INDEPENDENT MANUFACTURERS and CUTTERS of WOOL, HAIR and JUTE FELTS

Improvements on '49 Chevrolets

(Continued from page 42)

a more uniform spring rate at all loads. Rear shock absorbers are of direct acting type and diagonally mounted. The 4.11 to 1 ratio hypoid rear axle remains unchanged but is lighter due to the reduction in tread to 58½ in. Axle shaft flanges are smaller and lighter and have only five bolts. Rear spring pads are relocated to suit the change in tread.

Steering linkage has been changed to provide center-point steering control and incorporates an adjustable drag

link connecting the pitman arm to a third arm pivoted at the center of the front suspension cross member. Equal length tie rods connect to the third arm. The pitman shaft is shorter and straddle mounted for rigidity. The mast jacket has been increased in diameter and is nearly five in. shorter. It is pressed into the gear housing instead of the former method of clamping.

The braking system is of the same size with double articulated shoes. To take care of the forward shifting of

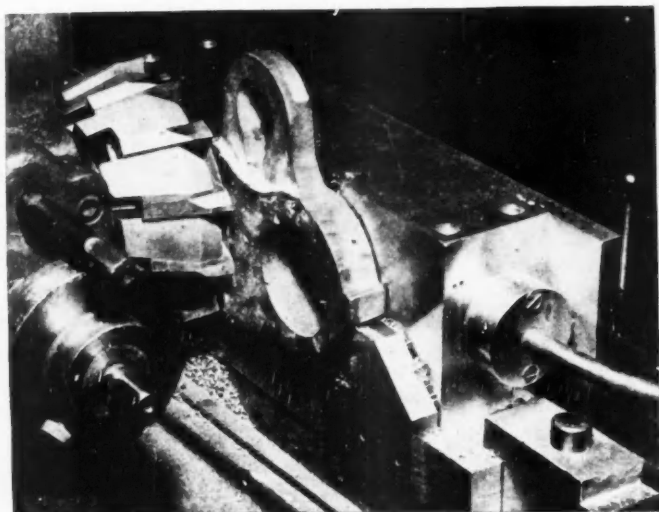
weight, the front braking effort has been increased suitably by increasing the diameter of front wheel cylinders by 1/16 to 15/16 in. while the rear wheel brake cylinders are reduced by 1/16 to 1½ in. Hydraulic piping is simplified by eliminating one pipe and its connections. The parking brake is operated by an L-shaped pull handle mounted below the instrument panel to the right of the steering column with the handle closer to the driver. Improved linkage reduces the force required to apply the brake.

The fuel tank is of the same type but is mounted below the underbody on the left side and is filled from a filler below a door in the left rear fender. Filling rate has been increased by use of a new filler vent pipe.

Super balloon, low pressure tires, 6.70-15, 4-ply are standard equipment and are mounted on 15 x 5K rims. The bolt circle of the wheels is reduced to 4¾ in. and has five bolts instead of six.

The radiator is new, nearly square in shape with core area increased more than eight per cent. The filler neck has provision for a four-psi pressure sealing cap if extreme cooling requirements are encountered.

The new models offer an improved type heating and ventilating system. Since the cowl ventilator is eliminated in the new bodies, fresh air now is drawn through ducts on each side leading from the front end. Air is metered by butterfly valves positioned by manually controlled knobs below the instrument panel.



Loading Time Reduced to an Instant Milling Castings with Power-Grip Holding

Illustration shows Power-Grip Chuck holding rough cast iron casting for milling. Cut is ¼" deep, with 6" dia. Carbide tipped face milling cutter at 272 r.p.m., and feed at 16" per minute.

Power-Grip Chucks are an easy solution to many problems of holding castings. Simple, inexpensive adaptors can be made for castings of odd shapes and sizes. Work is set in accurate position, ready for milling, instantaneously. Reducing loading and unloading time to the extreme minimum means eliminating the major portion of the cost of most milling jobs, and with Power-Grip Chucks this can be realized quickly.

You can learn the possibilities for any job by sending us prints and operating data, so we can submit a complete proposal for Power-Grip Holding.

ROCKFORD MAGNETIC PRODUCTS CO., INC.

1314 18th Avenue, Rockford, Illinois



ROCKFORD



Send for
This Booklet

1949 Pontiac

(Continued from page 37)

floor of the body rather than to the frame as before. At the same time the fuel gage has been shifted to a location midway between the top and forward wall of the tank where it is readily accessible for removal without dropping the fuel tank.

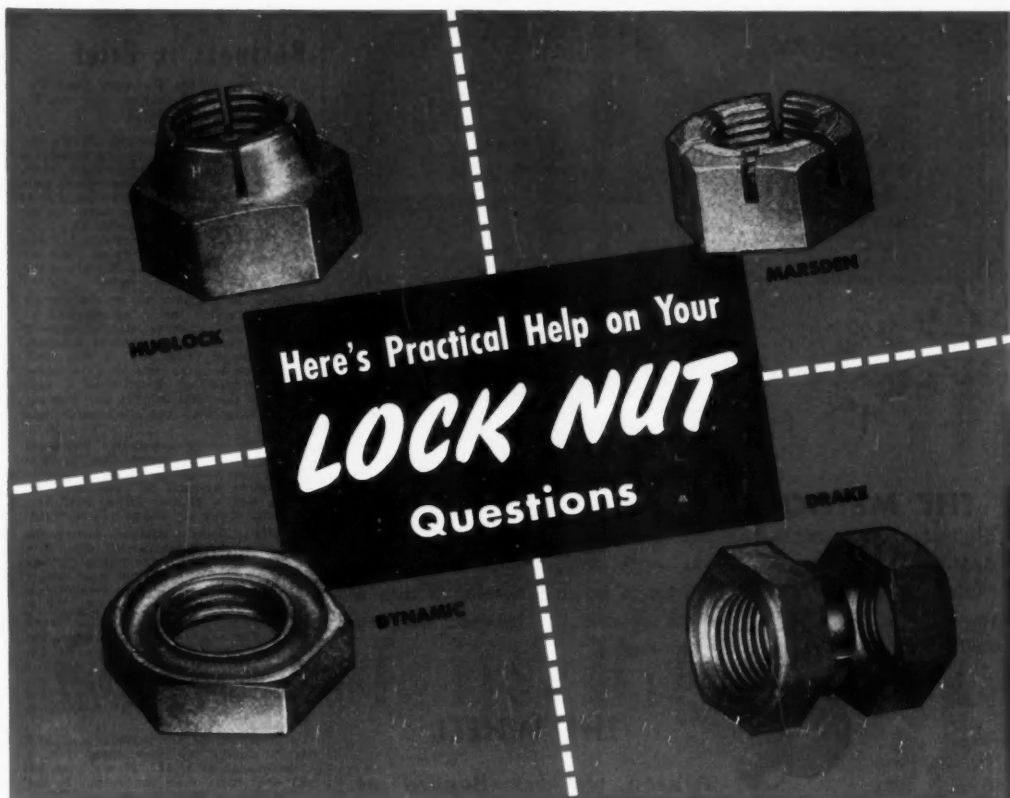
Capacity of the new underseat heater and defroster has been increased, and distribution made more uniform by use of a heater distribution manifold, and temperature control is more responsive. The temperature control unit now is mounted on the left side on the instrument panel for convenience.

Turn signals, offered as optional equipment, will have a neat built-in appearance and have the feature of automatic return after the turn has been completed.

Read

AUTOMOTIVE INDUSTRIES

Regularly



Every problem of vibration and loosening of parts calls for careful study to find just the right answer. "National" engineers have encountered just about every type of problem, and our line of Lock Nuts is designed to meet an unusually wide range

of requirements. The booklet illustrated here contains much useful data and should be helpful in determining type, size and cost of lock nuts for a given application. A copy will be sent on request.



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For heavy duty—National's "Drake" Lock Nut withstands severe stress, shock or vibration. A two-piece, positive lock for use on rugged, heavy equipment, where size and weight are not a factor.

To withstand shear only—National's "Dynamic" Lock Nut is a thin, lightweight nut with diaphragm lock, for use where clearance is a factor and where strains are in shear only.

For shock-loading or vibration, even under heat, oil or moisture, National's "Huglock" Lock Nut is a one-piece, all-metal lock nut. Easily installed, it grips the bolt threads and maintains locking effect whether seated or not.

For effective, low-cost locking. National's "Marsden" Lock Nut is a one-piece, cantilever action type, easily applied, free running until seated. For the most complete line of standard and special fasteners, come to "National".

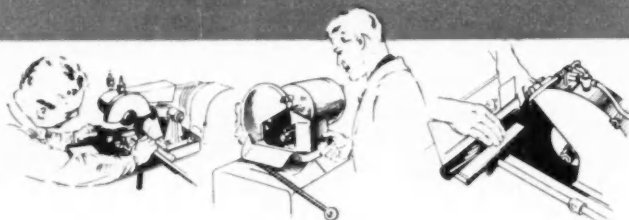


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ABRASIVE
CUTTING
EXPERT

Business in Brief

Written by the Guaranty Trust Co.,
New York. Exclusively for AUTO-
MOTIVE INDUSTRIES.

General business activity during the first week in January registered a moderate increase. Department store sales, electric power production, railway freight loadings, bituminous coal output and construction were higher than in the preceding week. The *New York Times* index of activity for the week ended Jan. 1 stands at 142.9, as compared with 152.4 in the preceding week and 153.3 a year ago.

Sales of department stores during the week ended Jan. 8, as reported by the Federal Reserve Board, equaled 274 per cent of the 1935-39 average, as compared with 294 in the week before. Sales were nine per cent above the corresponding distribution a year ago, and the total in 1948 was five per cent greater than the comparable sum in 1947.

Electric power production increased during the week ended Jan. 8. The output was 7.8 per cent above the corresponding amount in 1948, as compared with a similar advance of 14.2 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 721,507 cars, 23.4 per cent more than the figure for the week before but 13.2 per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended Jan. 8 averaged 5,453,850 bbl daily, 156,809 bbl less than in the preceding week but 140,713 bbl above the comparable output in 1948. The decline reportedly reflected the recent mandatory reduction of oil production in Texas.

Production of bituminous coal and lignite during the week ended Jan. 8 is estimated at 11,480,000 net tons, 32 per cent more than the output in the week before, but 17 per cent below the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended Jan. 12, according to *Engineering News-Record*, was \$122,583,000, six per cent more than the preceding weekly figure and 59 per cent above the comparable sum in 1948. The total recorded for two weeks of this year was 73 per cent more than the corresponding amount in 1948. Private construction was 69 per cent above that a year ago, and public construction increased by 75 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended Jan. 4, at 161.3 per cent of the 1926 average, was 0.6 per cent lower than in the preceding week and 2.5 per cent less than the corresponding figure in 1948. Prices of livestock declined sharply, while the average of prices of all commodities other than farm products and foods rose slightly.

Member bank reserve balances decreased \$270 million during the week ended Jan. 12. Underlying changes thus reflected included a decline of \$534 million in reserve bank credit, accompanied by reductions of \$232 million in money in circulation, and \$12 million in Treasury deposits with Federal Reserve banks.

Total loans and investments of reporting member banks decreased \$113 million during the week ended Jan. 5. A decline of \$195 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, \$15,366 million, shows a net increase of \$648 million in 12 months.



Worthy of its High Rank

Make victory inevitable! . . . in that war with friction, deep down in the clutch assembly. Just let the Aetna T Type Clutch Release bearing take full command.

This famous bearing was born to fight, born with 5-star qualifications which account for its complete dependability and top ranking position with the majority of car, truck and tractor manufacturers—

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- ★ exclusive T retainer maintains permanently true raceway alignment—ends eccentric thrust, chatter and excessive wear.
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- ★ self-lubricated for life, it can be installed and forgotten. No need for costly grease fittings or oil lines.
- ★ built of the highest quality materials, to the highest precision standards of the bearing maker's art.

Write for clutch release bearing engineering book and testing samples.

Aetna

T-TYPE Clutch Release BEARINGS

WITH THE...  ...THAT TAMES TROUBLE

New Engines Dominate the National Boat Show

(Continued from page 29)

six Diesel engine of 249 cu in. displacement with a built-in heat exchanger. Two models are offered, one developing 70 hp and the other with an output of 95 hp.


Packard has added a 3.551 reduction gear which makes the Packard 100-hp six and 150-hp eight suitable for use in heavy-duty work boats and large pleasure craft.

Coming to the outboard motors, Elto has reappeared for the first time since the war and was displayed along with the Evinrude line. It is offered in two models—a five-hp Sportster and a 12-hp Speedster, both of the two-cyl, alternate firing type. Evinrude is again producing its Big Four, a 50-hp model which was suspended in 1947 because of material shortages. The 1949

Zephyr, a 5.4 hp model, is now fitted with a "Fisherman's Drive," a protective housing forward of the propeller designed to prevent damage when operated in weeds and underwater growth.

Featured in the Johnson line was a 10-hp QD model with a gear shift arrangement which permits starting in neutral and shifting into forward or reverse. This motor and the SD model 16-hp alternate firing twin are equipped with a separate fuel tank of five gallons capacity. The tank is attached to the motor by a quick-detachable 12-ft double fuel line and may be carried at any convenient location in the boat within reach of the fuel line. Scott-Atwater also exhibited a gear shifting device on its new motors. The four-hp single, five-hp twin and seven and a half hp twin were equipped with the gear shift.

Three new Mercury outboards were displayed; a five-hp alternate firing twin, a Super-10 which is a deluxe version of the 10-hp Lightning model, and a four-cylinder motor of entirely new design. An unusual feature of the four-cylinder model is the use of a conventional automotive type magneto driven from the crankshaft between number two and number three cylinders. The power head has its four cylinders in line, and is mounted with the crankshaft vertical.



PERM-A-CLOP
STABILIZED DEGREASING SOLVENT
gives
MAXIMUM SAFETY ✓
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BECAUSE—

★ It is the most highly stabilized of all chlorinated degreasing solvents.

★ It retains its stability during distillation, as a vapor, and as a condensate.

★ It resists heat, light, moisture and catalytic action under conditions where less stable solvents break down into sludge and corrosive acid.

★ It does not attack or stain any metal.

★ It reduces the number of shutdowns required for cleaning out the degreaser.

★ It is non-flammable and non-explosive.

★ It can be used and reused indefinitely, requiring only occasional small additions to compensate for natural vapor loss.

Competitive tests by large users of degreasing solvents show conclusively that for safety, surety and over-all operating economy, no other solvent equals Perm-A-Clor—the most stable of all chlorinated safety solvents.



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DETROIT 32, MICHIGAN *Corporation*

DEGREASING MACHINES AND SAFETY SOLVENTS • METAL PARTS WASHERS • ALKALI AND EMULSION CLEANERS AND STRIPPERS • PROCESSING EQUIPMENT • SPRAY BOOTH COMPOUNDS

Alcoa and Tapered Aluminum Sheets

Editor, AUTOMOTIVE INDUSTRIES:

Referring to the discussion in the item, "Tapered Sheets," which was published on page 64 of the November 15th issue of AUTOMOTIVE INDUSTRIES, we would like to amplify it with the following statement:

Aluminum Company of America's decision to install production equipment for rolling longitudinally tapered sheet for aircraft will depend on the economic aspects of the problem. Alcoa has been experimenting with the rolling and flattening of tapered sheet for a number of years, and has spent thousands of dollars on this development. The company has a mill set up on an experimental basis, and has furnished experimental quantities of tapered sheet to at least four aircraft manufacturers for their evaluation of its characteristics. Alcoa has also completed the engineering and estimates required for the conversion of existing rolling facilities to a production unit for tapered sheet. In the meantime, Alcoa is willing and ready to accept orders for tapered sheet within the limits that can be manufactured on the present experimental equipment.

Very truly yours,
ALUMINUM COMPANY OF AMERICA

Kirby F. Thornton
Head, Aircraft Section
Development Division

New BESLY Double Vertical Spindle GRINDER

PRECISION GRINDS SMALL PARTS

faster...at lower cost

High speed production on close tolerance small parts grinding is easily achieved with this versatile No. 905 Besly. It's a proved design with new and unique features that speed up output. Grinds wet or dry—as fast as it can be loaded: 2400 pieces per hour manually, 5000 or more with feeder attachment depending on material and area to be ground.

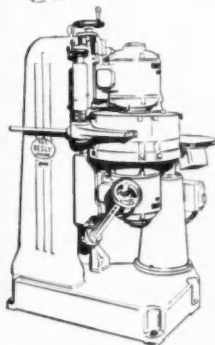
In addition to coil spring ends, carbon brushes, ceramics and plastics, the "905" handles a large variety of small steel, aluminum, copper, brass, gray iron and other parts — fed manually, by magazine or by hopper.

The "905" may answer your many problems of stabilizing production costs. Why not discuss the possibilities with a Besly engineer?



TITAN WHEELS

Write for this free booklet which offers helpful facts on abrasive wheels . . . It contains valuable data on grinding wheels and abrasives. Learn how Besly-Titan Steelbacs cut "down time" and boost output.



- Quickly Convertible from one job to another by easy replacement of one feed wheel.
- Faster Loading is attained by horizontal feed wheel. Unloads automatically by gravity.
- Designed Especially for small parts grinding — four times as fast as previous methods.
- Saves Money: supplies the need for an intermediate size machine.

SPECIFICATIONS

Double vertical spindle type. May be equipped to grind wet or dry. Choice of 15", 16" or 18" diameter abrasive discs. Motors: 3 H.P. 1750 RPM. Overall length: 41 1/8". Overall width: 41 1/8". Height: 66".

Maybe GRINDING is the Better Way . . .

Better Check with

**BESLY GRINDERS AND ACCESSORIES
BESLY TAPS • BESLY TITAN ABRASIVE WHEELS**

BESLY

CHARLES H. BESLY & COMPANY • 118-124 North Clinton Street, Chicago 6, Illinois

Factory: Beloit, Wisconsin

If Your Production Requires Milling Intricate Parts Like These

BEFORE



AFTER



You Need
the New
Sundstrand
*Cam-
Controlled*
Contour
Milling
Machine



RIGIDMILS • FLUID-SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



Some of America's finest refrigerators
keep temperatures under close control
with Hydron Bellows Assemblies

Will Bellows Assemblies do it better for you?

Many other firms looking for better ways to control temperature or pressure, to seal shafts or valves against leakage, or to transmit motion, have turned to bellows assemblies. Investigation before your designs are too far advanced may pay you, too. Let our engineering department make a confidential analysis of your sketches and specifications and make a recommendation. No obligation, of course.

CLIFFORD MANUFACTURING COMPANY,
563 GROVE ST., WALTHAM 54, MASS. Division
of Standard-Thomson Corporation. Offices in New
York, Detroit, Chicago, Los Angeles.



CLIFFORD

Further Heights

HYDRAULICALLY - FORMED BELLOWS
AND BELLOWS ASSEMBLIES

ALL-ALUMINUM OIL COOLERS
FOR AIRCRAFT ENGINES



Instrument
Bellows



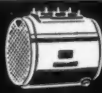
Aircraft
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Steam Trap
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Bellows
Seal
Assembly



All-Aluminum
Cylindrical
Oil Cooler



All-Aluminum
Oval Oil
Cooler

Caterpillar's Huge Engine Plant

(Continued from page 32)

plan of operation. The machines found here are capable of quick changeover from one size of part to another in keeping with the economics of the lot sizes in which these engines must be produced. On the other hand, even the few examples described here will indicate that the equipment is capable of high productivity and should yield maximum cost economy comparable with special purpose machinery while running on a given lot.

Caterpillar is considered to be one of

the oldest exponents of induction hardening technique for certain applications. At the present time they have two enormous tunnel-type Tocco induction hardening machines for crankshafts, a big vertical induction hardening machine for camshafts designed by their own engineering department, and a real out-sized vertical Budd induction hardening machine for hardening cylinder liner bores.

The cleaning of large parts such as cylinder blocks and cylinder heads is

done in special washing machines installed at several points.

Because Caterpillar moves large tonnages of heavy parts rather than a heavy volume of small parts, reliance is placed primarily upon a special arrangement of heavy duty gravity roller conveyors for each unit. Heavy lifting is done by overhead cranes and hoists. Interdepartmental movement of raw materials and finished parts is handled by means of an industrial railroad system within the plant, with long trains of small flat cars hauled by rubber tired tractors. In other cases, such as the crankshaft drilling lines, the long process machine is fitted with its own table-high, built-in conveyor for moving work from one station to another.

With further reference to materials handling, it is of interest to find that the plant has 18,000 ft of gravity roller conveyor lines, one metal belt running 80 ft, one fabric belt 80 ft long, two depressed flight conveyors 110 ft long for handling chips at the machine lines, and a 750-ft overhead monorail line. In the assembly department they have three power driven assembly lines totaling 600 ft, 4000 ft of gravity roller conveyors, and an extensive installation of overhead monorails for electric hoist movement.

Engine assembly lines are skillfully organized for the integration of engines on a power-driven floor conveyor. On the engine assembly lines, the assembly is developed in two major stages. At the start the block is mounted on a special stand on the conveyor in an inclined position with the crankcase end up to facilitate the installation of the crankshaft, connecting rods, pistons, and fastenings. At about mid-point along the line, the sub-assembly is lifted off the stand, turned upright, and moved to another assembly stand for the final operations. At this point the stand used for the initial sub-assembly is lifted off the conveyor by a hoist and hooked onto an overhead rail which returns it to the start of the line by gravity.

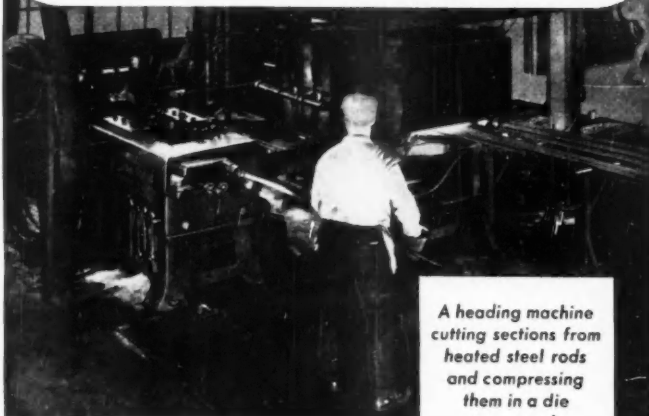
It is obvious from the outline given above that this new plant is a major operation involving tremendous detail and an enormous investment. Suffice it is to say that in the opinion of the writer it is much too extensive to suffer condensation in any single article. Consequently, we have selected just a small number of operations from various departments and give a few pertinent facts about each one in the following text. These examples taken together with close-ups of the equipment should give the reader some impression of the scope and size of this remarkable plant.

In considering the following examples, observe that although the machine tools bear familiar names—Norton and Landis grinders, Cincinnati mills, Cincinnati broaching machines, W. F. & John Barnes drills and boring mills, Leland-Gifford crankshaft drilling machines, Fay lathes, Heald in-

(Turn to page 82, please)

This is How

STROM BALLS are Born



A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

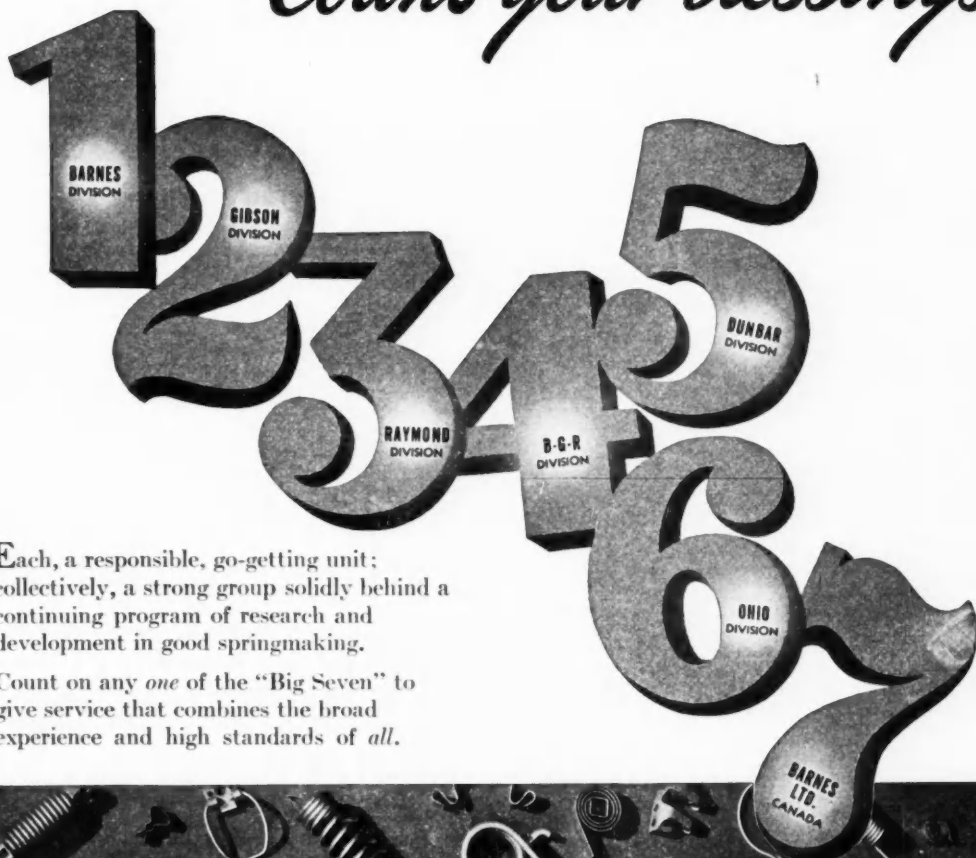
The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of industry. Strom Steel Ball Co., 1850 South 54th Avenue, Cicero 50, Illinois.

Strom BALLS  **Serve Industry**

Largest Independent and Exclusive Metal Ball Manufacturer

NEED SPRINGS?

Count your blessings



Each, a responsible, go-getting unit; collectively, a strong group solidly behind a continuing program of research and development in good springmaking.

Count on any one of the "Big Seven" to give service that combines the broad experience and high standards of all.

ORIGINAL DIVISIONS ASSOCIATED SPRING COOPERATION

WALLACE BARNES COMPANY BRISTOL, CONNECTICUT	THE WILLIAM D. GIBSON COMPANY 1800 CLYBOURN AVE. CHICAGO 14,	RAYMOND Manufacturing COMPANY CORY, PENNSYLVANIA	BARNES-GIBSON - RAYMOND 6400 MILLER AVE. DETROIT 12, and ANN ARBOR, MICH.
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..... AND DUNBAR BROTHERS COMPANY DIVISION, BRISTOL, CONN.

OHIO DIVISION, 1712 EAST FIRST STREET, DAYTON, OHIO

IN CANADA, THE WALLACE BARNES CO., LTD., HAMILTON, ONT.



Setting A New High IN QUALITY-VALUE

TODAY'S Layne Well Water Systems and Vertical Turbine Pumps set an amazingly new high in long lasting quality and big dollar value. Years and years of constant improvements in design has given them unmatched over-all efficiency. And along with high efficiency there have been tremendous improvements in quality. All strain points have been made heavier and stronger. All bearing surfaces are now tougher and longer lasting.

All in all, your Layne Well Water Systems and Vertical Turbine Pumps of today produce more water at lower operation cost than ever before. Dependability in construction features is not limited to a season or two. They are there to provide service for years and years.

But if service of any nature is ever required, the Nation-wide Layne organization has the facilities and know-how to put your system back in perfect order with a minimum loss of time.

For further information about Layne Well Water Systems and Layne Vertical Turbine Pumps, write for catalogs and bulletins. No obligation. Address **LAYNE & BOWLER, INC.** General Offices, MEMPHIS 8, TENN.

LAYNE

WELL WATER SYSTEMS

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. • Layne-Atlantic Co., Norfolk, Va. • Layne-Central Co., Memphis, Tenn. • Layne-Northern Co., Milwaukee, Wis. • Layne-Louisiana Co., Lake Charles, La. • Louisiana Well Co., Monroe, La. • Layne-New York Co., New York City • Layne-Northwest Co., Milwaukee, Wis. • Layne-Ohio Co., Columbus, Ohio • Layne-Pacific, Inc., Seattle, Wash. • Layne-Texas Co., Houston, Texas • Layne-Western Co., Kansas City, Mo. • Layne-Minnesota Co., Minneapolis, Minn. • International Water Corporation, Pittsburgh, Pa. • International Water Supply, Ltd., London, Ont., Can. • Layne-Hispano Americana, S. A., Mexico, D. F.

ternal grinders, Heald and Ex-Cell-O precision boring machines, etc.—the equipment is distinctive because of its size and the size and weight of the parts it accommodates. Thus a crankshaft lathe or grinder is really an enormous piece of machinery, larger than is usually found in engine plants. The same is true of the multiple spindle drills and boring mills for cylinder blocks.

Let us now examine the details of a few selected pieces of equipment. Here is a Landis crankshaft grinder—typical of others used in the department. It finish grinds the main bearing journals on crankshafts for V-8 and V-12 engines. The machine has a 16 by 96 in. bed and employs a 4½ by 42 in. grinding wheel.

Another example of the enormous grinders required in this plant is the Norton machine for finish grinding intermediate crankshaft bearing journals. It has a bed 20 x 96 in., and a 2½ x 42 in. grinding wheel. To meet engineering specifications this machine is adjusted to hold the total tolerance on diameter to 0.001 in., will hold taper to a total tolerance of 0.0003 in., and out-of-round to 0.0005 in. total tolerance.

The new Gisholt Superfinisher for crankshafts handles shafts for the D7 and D8 engines and will produce a surface finish of 5-microinches (rms).

The enormous Budd induction hardening machine which is used for hard-

ening the bores of the cylinder sleeves produced here stands 21 ft high. Unusually fast in cycle, the machine will harden liners at the rate of about 75 an hour, producing a hardness ranging from 47 to 55 on the Rockwell C-scale.

To aid in visualizing the basic features of this plant we have reproduced photographs of some of the machinery and assembly lines which may be considered typical of the activity.

Selective Hardening

(Continued from page 33)

on the six internal cam lobes. Metal inserts are provided to prevent wear as the parts slide on and off, and over-heating of the stripper is eliminated by water cooling.

The machine accurately measures and controls surface temperature which must be held to very close limits for best results. A sensitive thermopile is focused on the work and, since radiation is proportional to temperature, it controls the heating cycle accurately and instantaneously.

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MONEY MAKING OPPORTUNITY for salesmen. Quick selling specialty. Every service station or garage needs two or more. Write for information about our tested sales plan, Angel Sales Company, manufacturers of automatic attachments for Buckeye Nozzles, 43 School Street, Yonkers 2, N. Y.

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INDUSTRIES**
Goes into
Leading

Plants in the
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and Aircraft
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GREASE RETAINERS
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THE COMPLETE LINE THAT COMPLETELY SATISFIES

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—that has contributed in many ways to the dependable performance of today's Cars, Trucks and Buses . . . while keeping constantly alert to the future advancement of the Automotive Industry.



PRODUCTION

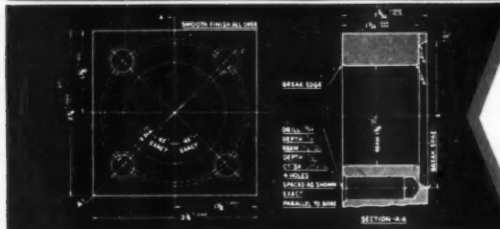
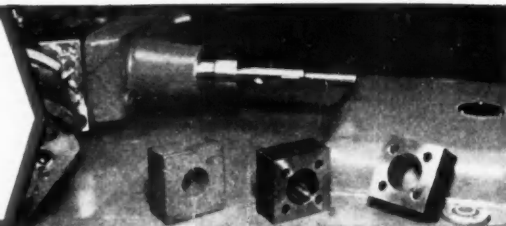
—that is keyed to large-scale daily needs of the Automotive Industry, and constantly expanding to keep pace with its increasing precision parts requirements.

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THESE UNITS FORM BORG-WARNER. Executive Offices, Chicago: 5300 N. MEYER • BORG-WARNER INTERNATIONAL • BORG-WARNER SERVICE PARTS • CALMET STEEL • DETROIT GEAR • DETROIT VAPOR STOVE • FLANKLIN STEEL • INTERNATIONAL STEEL • INTERNATIONAL UTILITY UNIT • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON • MARVEL-SCHWAB CARBURETOR • MECHANICAL UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN CO., LTD. • MORSE • MORSE-HEAT • MORSE MACHINE PRODUCTS • PERCO PRODUCTS • ROCKFORD CLUTCH • SPRING DIVISION • SUPERIOR INSET STEEL DIVISION • WARNER AUTOMOTIVE PARTS • WARNER GEAR • WARNER GEAR CO., LTD.

Do it QUICK:

14 machining operations* in 1.49 minutes on this aluminum bronze cam block blank.



Do it ACCURATELY:

On this job, boring, facing, drilling and reaming are accomplished not only at maximum speed but with the exactness specified on the blue print.

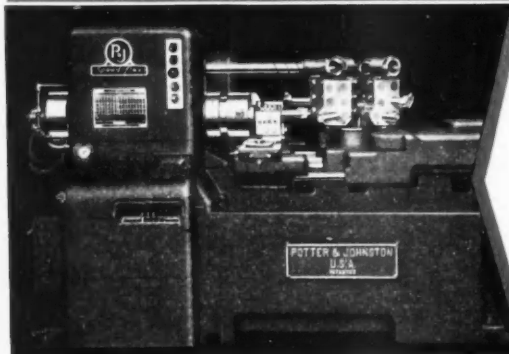
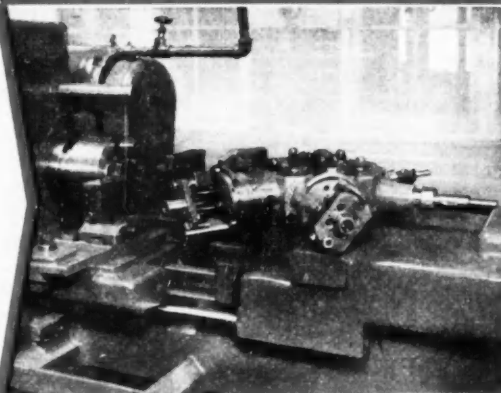
Do it ALL:

Here's the tooling. *One* setting does the trick. The recessed side of the blank is presented to the spindle and gripped on O. D. with 3 chuck jaws. Then:

- 1st T. F. — Rough bore hole
Rough face, one side
- 2nd T. F. — Finish bore hole
Chamfer hole
Finish face, one side
- 3rd T. F. — Ream hole, $1\frac{1}{8}$ " dia.
- 4th T. F. — Drill four $19/64$ " dia. holes on 2" B.C.
- 5th T. F. — Ream four $5/16$ " dia. holes on 2" B.C.

*Adds up to 14 operations

Note that even the *drilling* is done on the P&J Turret Lathe — a tremendous time and trouble saver.



Do it on the P&J 3U SPEED-FLEX

— the last word in Automatic Turret Lathes for low cost, quantity production of parts up to 6" dia; equipped with four automatic changes of speed and three automatic feed changes, electro-pneumatically controlled; split second shift from rapid traverse to reverse feed; independent or simultaneous cross-slide operation with selected turret faces or with all six.

Are You Willing to be Shown?

—Potter & Johnston tooling experts will gladly work out tooling and time estimates for *your* small parts production problems. Simply send us parts or prints.

Potter & Johnston Company
Pawtucket, R. I.
subsidiary of Pratt & Whitney
Division Niles-Bement-Pond Company



108 A's ON HIS REPORT CARD

HE HAS TO PASS WITH HONORS
BEFORE HE CAN GO TO WORK FOR YOU



THE flanged copper-lead sleeve bearing shown above was graduated from a rigid "school" conducted by Federal-Mogul's Quality Control group.

In the process of 28 manufacturing operations, this bearing received a series of precise setup and inspection measurement checks—84 in all! Twenty-four additional tests included analyses, temperature controls, special and visual examinations.

Where "A" meant 100%, this bearing passed 108 times! Otherwise, it never would have left the factory.

The same vigilant care is exercised throughout all six Federal-Mogul plants, in the manufacture of every bearing. We are equipped for large or small runs, to your specifications. Consult our engineers on *your* bearing requirements.



HIGH SPEED, high temperature, automotive type bearings available in many combinations.



HEAVY LOAD for big Diesels, power plants, etc.—bearings up to 27½" O.D., steel and bronze back.



SPEED & LOAD bearings for pumps, compressors, industrial electric motors and similar uses.



BRONZE PARTS in many shapes, sizes; thrust washers, bushings; for many types of applications.

Power goes to work smoothly through

FEDERAL-MOGUL

FEDERAL-MOGUL CORPORATION

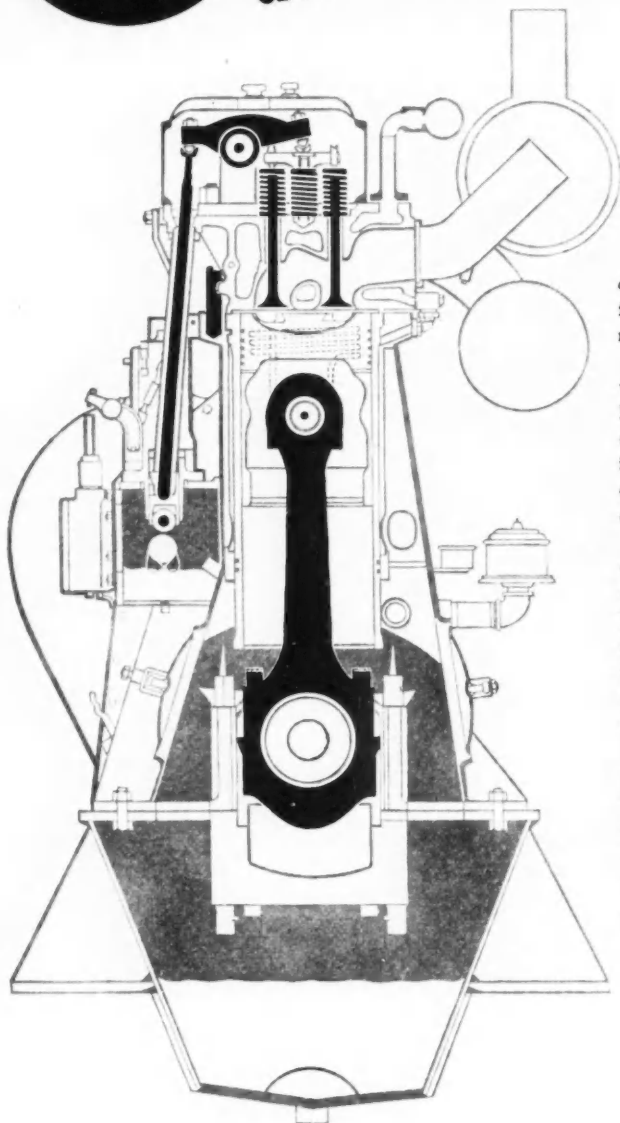
**FEDERAL
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11037 SHOEMAKER, DETROIT 13, MICH.

Silent SLEEVE BEARINGS

inside
story
of

diesel dependability



The diesel engine parts emphasized in the cutaway drawing are usually made from alloy steels. They are the rods, pins, bolts, springs, rockers, and valves that are largely responsible for the dependability and efficiency of modern diesel power.

In many of these parts alloy steel provides the added strength to take the higher stresses encountered in this type of engine. In other parts it furnishes the increased resistance to corrosion, to heat, and to wear, needed for long trouble-free operation.

Bethlehem produces the high-grade alloy steels used for diesel parts by many of the nation's leading engine builders. From start to finish, the uniformity and quality of Bethlehem alloy steels are rigidly controlled. Every known precaution is taken to see that they meet the exacting requirements of the industry.

In addition to manufacturing the full range of AISI steels Bethlehem also provides metallurgical assistance to diesel builders. Our metallurgists are glad to help with any problems concerning analysis, heat-treatment, forging or machining.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation



BETHLEHEM ALLOY STEELS



CAPABLE HANDS



When "unimportant" jobs in a manufacturing plant are regarded as of no significance, important operations can very well be seriously affected.

That is why at Allied every job is important and is entrusted to capable hands. The

"end result" is a product that has received careful attention in every department—that in every way reflects Precision, Experience, Dependability.

ALLIED PRODUCTS CORPORATION

DEPARTMENT 44

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HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS
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MOLDS • SPECIAL PRODUCTION TOOLS • R-B INTERCHANGEABLE PUNCHES AND DIES • DIE MAKERS' SUPPLIES

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for dependable Diesel cranking**

For peak performance, use Exide Diesel Cranking Batteries! They're built specially for the job... with mighty power to handle the toughest cranking... with extra ruggedness for hard service in all climates... and in types and sizes for on and off the highway automotive equipment of every kind.

Exide
BATTERIES

Manufacturers, owners and operators of Diesel powered trucks, tractors, and earth-moving units can always count on Exide Batteries for dependable performance, long battery life and low cost maintenance.

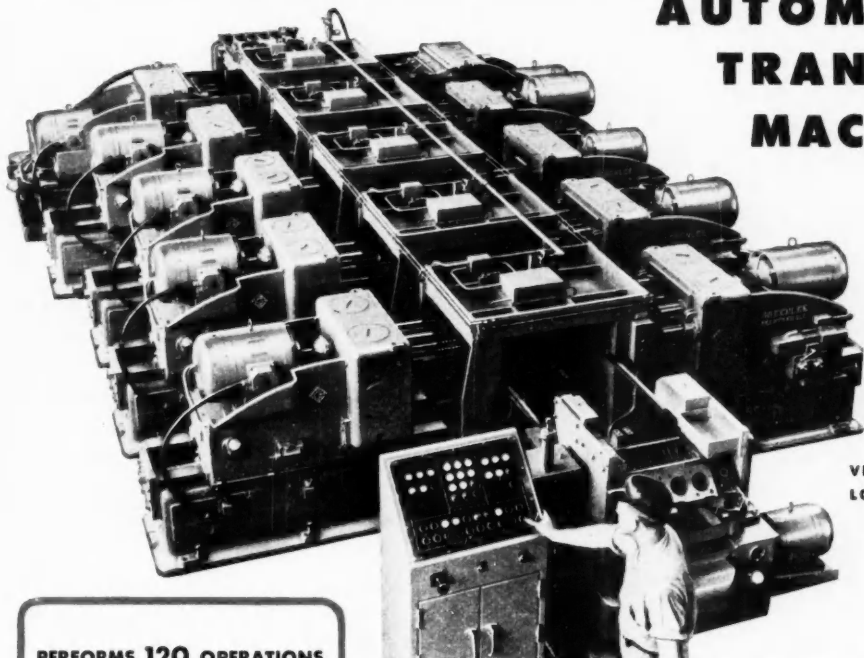
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GREENLEE

AUTOMATIC TRANSFER MACHINE



VIEW FROM
LOADING END

PERFORMS 120 OPERATIONS

STATION 1 Load and Turn Over 180 Degrees	
LEFT HAND UNITS	RIGHT HAND UNITS
STATION 2	
Drill 12 Holes	Drill 14 Holes
Drill & Chamfer 2 Holes	
STATION 3	
Drill 7 Holes	Drill 10 Holes
STATION 4	
Drill 3 Holes	Drill 2 Holes
C Bore & Chamfer 1 Hole	11" Deep
Ream 2 Holes	
STATION 5	
Drill 4 Holes	Drill 1 Hole
Ream 2 Holes	Ream 2 Holes
Chamfer 11 Holes	Chamfer 16 Holes
STATION 6	
Tap 14 Holes	Tap 17 Holes
STATION 7 Unload	
58 OPERATIONS	62 OPERATIONS
TOTAL — 120 OPERATIONS	

FOR PROCESSING CYLINDER BLOCKS

PRODUCES **45** BLOCKS PER HOUR...

AT 80% EFFICIENCY

This 7-station automatic transfer machine performs a total of 120 individual drilling, chamfering, counterboring, reaming, and tapping operations in a continuous cycle on cylinder blocks for a leading automobile manufacturer. The loading end of the machine is equipped with a turnover fixture that revolves the work 180 degrees, eliminating handling of the piece as it is received from previous machining operations.

Greenlee patented precision-ground individual lead screw spindles tap a total of 31 holes in both ends of the cylinder blocks. All tapping units are provided with a rapid approach and return stroke. Automatic

tap lubrication insures clean, precision-cut threads with maximum tool life.

The electrically-controlled hydraulic units are easily accessible for set-ups and for making tool changes, and are designed so they can be independently operated. Ample room is provided between stations for work inspection. Automatic lubrication of each vital moving part assures long machine life and efficient operation.

The experience of Greenlee engineers and the skill of Greenlee manufacturing personnel were combined to produce this machine. The effectiveness of this Greenlee team can be used by you, too, toward the licking of your production machinery problems.

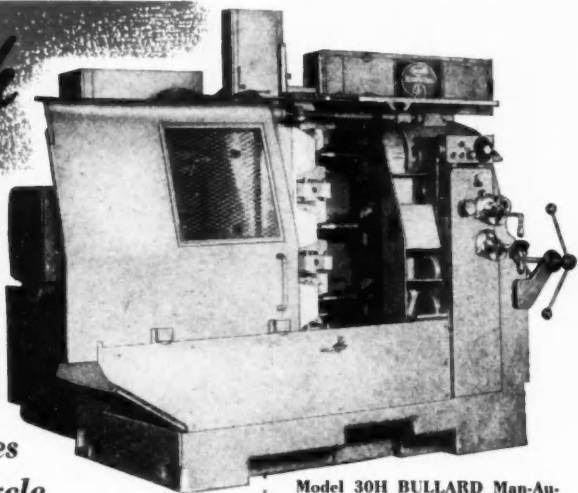
Additional Information Available Upon Request

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DETROIT OFFICE: 504 CURTIS BUILDING, DETROIT 2, MICHIGAN



MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

It's 3 for 1 with BULLARD MODEL 30H HORIZONTAL LATHE



Model 30H Man-Au-Trol Horizontal Lathe Produces 3 Identical Pieces Per Cycle

Reports are now coming in from owners of BULLARD Man-Au-Trol Horizontal Lathes proving that this machine's unique "3 for 1" method really pays off in lower production costs. See the accompanying chart for some actual figures.



These 8 Production Reports May Suggest Big Savings For YOU

Number	Part	Material	3 Pcs. Floor to Floor Time	Time per Piece
1	Third Motion Shaft	Steel Forging	2.21 min.	44 sec.
2	Inner Axle Shaft	SAE 4140	1.42 min.	32 sec.
3	Sector Shaft	SAE 5132	.8 min.	15 sec.
4	Crankshaft	Steel Casting	2.25 min.	45 sec.
5	Overdrive Main Shaft	SAE 4620	1.96 min.	39 sec.
6	Outer Race Bell	SAE 4620	2.0 min.	40 sec.
7	Counter Shaft	SAE 4320	1st chg. 1.78 min. 2nd chg. 1.63 min.	36 sec.—1st chuck 32.6 sec.—2nd chuck
8	Rear Axle Shaft	SAE 8630H Forge	2.30 min.	46 sec.

Model 30H BULLARD Man-Au-Trol Horizontal Lathe triples production on between-center shaft turning work by machining 3 finished pieces per cycle with its 3 identically tooled spindles. Simplified tooling for rough and finished cuts also reduces tooling costs. Multiple-tool blocks are provided when needed for grooving, recessing, chamfering, angle-turning and other such operations.

WANT ALL THE FACTS?

Here's a Lathe with unique "3 for 1" productivity, right-handed operating convenience, Man-Au-Trol versatility, (manual or automatic operation) and startling performance.

In the interest of lower manufacturing costs, make a study of the Model 30H BULLARD Man-Au-Trol Horizontal Lathe. Write today for booklet and time studies on your work. **THE BULLARD COMPANY,** Bridgeport 2, Connecticut.

16 MM SOUND MOTION PICTURE

available for Group Showing by writing for scheduling. When writing advise your preferred date.

USE BULLARD MACHINES FOR PRODUCTION ECONOMY

• 7200 stainless steel stampings per hour—

• tolerances held within 0.002" —



...using

DANLY

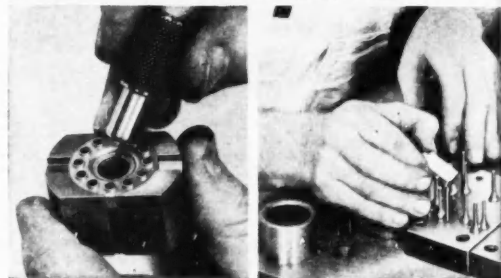
STANDARD PRECISION DIE SET

Sustained operating precision of die set reduces die wear...produces 200,000 stampings per grind

Inherent accuracy in Danly Die Sets permits taking full advantage of the die maker's precision under actual press operating conditions. As a result, close tolerances may be held and tool life is substantially increased.

In the stamping operation shown, stainless steel parts for electrical instruments are pierced, formed and blanked in an intricate progressive die. Tolerances are extremely close, and finished parts must pass rigid gage inspection.

Stampings are produced at a rate of 120 per minute. At



this high speed, a tolerance of 0.002 in. is held on inside and outside diameters and the distance between the bent arms. Danly Die Set accuracy is a major factor in maintaining punch-and-die relation, resulting in production of 200,000 parts between grinds.

DANLY ENGINEERING SERVICE—Use Danly Die Sets to insure the same close precision, high production and long die life on all of your press work. Consult our Engineering Dept. for helpful recommendations on die sets—large or small, standard or special—for any type of press operation. (No obligation.)

Danly offices in 10 key cities give immediate attention to your orders. Assembly plants (marked with stars) stock interchangeable parts for quick delivery of any standard die set to your specifications.

DANLY

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- ★ Detroit 16, 1549 Temple Ave.
- ★ Grand Rapids, 113 Michigan St., N. W.
- ★ Long Island City 1, 47-28 37th St.
- ★ Los Angeles 54, Ducommun Metals & Supply Co., 4890 S. Alameda
- ★ Milwaukee 2, 111 E. Wisconsin Ave.
- ★ Philadelphia 44, 18 W. Chelton Ave.
- ★ Rochester 4, 16 Commercial St.



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bulletin

Illustrates how Danly Service on special die sets can save you time and money.

DANLY

DANLY MACHINE SPECIALTIES, INC.

2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS



PRECISION DIE SETS...STANDARD AND SPECIAL

MECHANICAL PRESSES AND PRESS EQUIPMENT

"The best investment we ever made"



**If you want to CUT COSTS
... CUT WEIGHT!**

Take advantage of the extra strength of U-S-S Stainless Steel and engineer weight out of trailer construction. The almost incredibly light weight that can be attained adds many extra pounds to payload carrying capacity, means extra revenue and extra profits on every freight haul—means lower operating costs on every empty run.

U-S-S Stainless Steel is a perfected, service-tested Stainless that allows a wide latitude in design and permits the employment of the most advanced manufacturing techniques, and it is available for early delivery.

that's what they say about

STAINLESS STEEL trailers

ASK operators of Stainless Steel equipment and you'll get a lot of different reasons why they swear by Stainless construction.

One big operator in Philadelphia says, "We find Stainless Steel units cheaper to operate. They have run approximately 100,000 miles and are just as good as when purchased." Another in Akron, Ohio, states, "Many savings have been effected through the longer life of this construction as it is rust resisting and no yearly painting is required." A famous packer in Chicago has this to say, "The meat business is hard on trailers, due to the chemicals involved in cleaning the units and also because of the brine, salt and ice solutions we use for refrigeration. However, we have experienced practically no corrosion on our Stainless Steel trailers."

But why go on? Stainless Steel gives such money-saving results because it

combines maximum strength with maximum corrosion resistance. This makes it possible to get rid of every unnecessary pound of dead weight safely — permits construction that while lighter than ordinary is yet much stronger, and will never be weakened by corrosion.

With Stainless construction you obtain (1) maximum capacity and maximum returns with any type of load, (2) maximum strength that protects driver, load and vehicle, (3) maximum stamina that keeps units longer in service and more available, (4) minimum fuel and oil costs when running empty, and (5) lower license fees. That's why Stainless equipment pays for itself.

If you want to obtain these benefits for your equipment and need practical engineering advice and the latest fabricating data to help you apply U-S-S Stainless Steel, call on us.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
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U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL

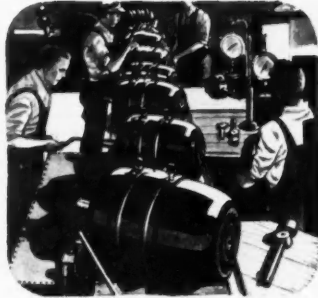
8-1630



1 1760—A strong back, sharp axe and plenty of time and patience were a must for the frontier homebuilder. He cleared the land, felled his trees, hewed logs to fit and hoped his house wouldn't leak when he finished.



2 1875—Lumber, the universal building material, was a budding industry. But woodworking machinery was hard pressed to keep pace with the tremendous demand. Urgently needed was low cost electrical power to boost output.



3 1915—Howell "Red Band" Electric Motors appeared. Applied to machines in woodworking and other important industries, these rugged, industrial type motors soon won wide recognition for making good on tough jobs.

WORKING WONDERS WITH WOOD

(Up to 225 Feet Per Minute)



4 Today—Electrically powered machines work wonders with wood. This modern moulder, for example, using 5 Howell Industrial Type Motors, can shave, trim and form four sides of a wood strip at the rate of 225 feet every minute . . . job costs are cut . . . more people enjoy more goods at less cost.

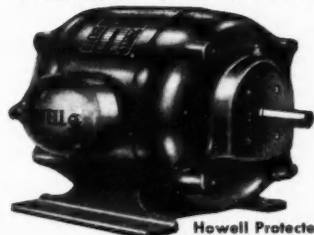
Here's another example of a tough industrial job solved by Howell Motors—the accepted industrial type motor.

Whether it's on planers, moulders, saws, lathes, pumps, fans, conveyors or dairy equipment, dependable, precision-built Howell Motors are an important source of power.

Are you using Howell Motors?

Free enterprise encourages mass production, supplies more jobs—provides more goods for more people at less cost.

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.



Howell Protected Type Motor

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.
Manufacturers of Quality Industrial Type Motors Since 1915

KELSEY-HAYES

French & Hecht Davenport, Iowa Plant

*World Famous source of Wheels,
Hubs, Axles, Parts for Farm Equipment!*



One of 8 Great Plants Specializing in Superior Automotive Products

Kelsey-Hayes' Davenport, Iowa Plant (French & Hecht) is the Implement Wheel Division of the great Kelsey-Hayes 8-plant organization. Wheels, hubs, axles and parts for tractors, for farm wagons, implements, and for all kinds of farm machinery (as well as for industrial equipment) are manufactured and shipped from here to the four corners of the world. Specialized "know-how," in each particular phase of plant production, assures a product superiority that has made Kelsey-Hayes also the major supplier to the automotive and trailer coach industries. For both original equipment and change-over requirements it's "Kelsey-Hayes."

K-H ASSURES PROVEN PRODUCTS AT
KELSEY-HAYES WHEEL COMPANY
DETROIT 32, MICHIGAN

Wheels—Hub and Drum Assemblies—Brakes—"Vadraulic" Brake Power Units—for Passenger Cars, Trucks, Buses, made by Kelsey-Hayes' 4 Michigan Plants and Windsor-Canada Plant • "Magdraulic" Electric Brakes • "Lathan Vacuum Power Brake Equipment for Tractor-Trailers—made by Kelsey-Hayes' South San Francisco-Lathan Plant
Wheels—Hubs—Axles—Parts for Farm Implements—made by Kelsey-Hayes' French & Hecht Plant at Davenport, Iowa.





A typical automatic Spra-Bonderite section in a modern finish line. A, cleaning; B, water rinse; C, Bonderizing; D, water rinse; E, Parcolene rinse; F, dry-off.

THE fine paint finish on your product will get some rough treatment after it leaves your plant. It will be subjected to high humidities, exposure, severe wear, and accidental scratches.

For an amazingly small fraction of the total finishing cost you can have the protection of Bonderizing—assurance of a durable paint finish.

Bonderizing—quick, simple, and easy to control and apply—does these things to protect and preserve fine paint finishes:

It provides a secure anchor to hold paint. No chipping or peeling.

It retards corrosion effectively.

It checks the spread of rust at the site of the

injury when paint is scratched or broken.

If your product has a paint finish, protect it and your customer's satisfaction by Bonderizing before you paint.

Full information is yours on request. A letter will bring you details on Bonderizing and what it can do for your product.

Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

PARKER

PARKER RUST PROOF COMPANY
2178 East Milwaukee Ave.
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BONDERIZING Holds Paint to Metal . . . PARKERIZING Inhibits Rust . . . PARCO LUBRIZING Retards Wear on Friction Surfaces



Steering Problems?

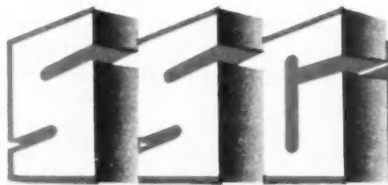
SAGINAW HAS THE ANSWERS

To design steering that will be just right for a given vehicle is an involved process. It's a job for steering specialists—experts who, through long experience, have gained the know-how that is essential to reaching the one best solution of the problem.

When you put your steering problems—for car, bus, truck, farm tractor—up to Saginaw, you can rest assured not only of a satisfactory solution, but also of a dependable source of supply to meet your production needs. Saginaw's experience and skill, Saginaw's resources and capacity are at your service.

- ***There's a Saginaw Steering Gear of the Type That Suits Your Needs***

Saginaw has led in improving conventional types of steering gear and in developing new and advanced types. You can choose the type that best suits your requirements—worm and sector, roller tooth, recirculating ball, or hydraulic power. They cover a complete range of ratios and capacities.

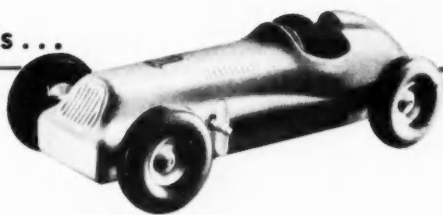


PRODUCTS

Saginaw
STEERING GEAR DIVISION
General Motors Corporation, Saginaw, Michigan

STEERING GEAR ASSEMBLIES • STEERING LINKAGE ASSEMBLIES
PROPELLER SHAFTS • DIESEL ENGINE AND AIRCRAFT PARTS

from powering this...



to opening the hood on this...



American Quality Springs

DO A BETTER JOB!

● These two photographs help to point out the wide variety of products for which we make springs.

Included in the list are bicycles and bird cages . . . clutches and door checks . . . gates and gasoline engines . . . typewriters and umbrellas . . . washing machines and window shades . . . and hundreds of other products.

The mechanical perfection of our American Quality Springs that enables them to do a better job is not a matter of pot luck! For our spring engineers carefully analyze the basic spring design factors of load, deflection, and space. And they use those factors to determine the stress, spring diameter, wire size, material, rate, solid height and free length.

Our vibration engineers have complete and modern equipment for testing all types of springs in fatigue and under the dynamic conditions to which they may be subjected.

Our metallurgical engineers make every effort to keep pace with all mechanical developments . . . and to keep

our spring wire free of defects.

Further, we don't believe in furnishing customers with springs that are "overpowered." In other words, we don't recommend stainless steel or special alloy steels when ordinary carbon steels would do the job.

So whether you are producing journal boxes or cash registers—baby carriages or clocks—whether you need giant hot-wound coil springs or tiny open-wound helical springs—springs of special design or some of the more common types, why not get in touch with us? We believe we can give you better springs and spring engineering service which will help you make a better product.

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AMERICAN QUALITY SPRINGS

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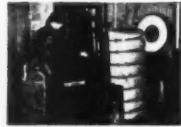
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Can Relax and
Rest Easy**



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EATON TAPPETS— for Maximum Performance and Service Life



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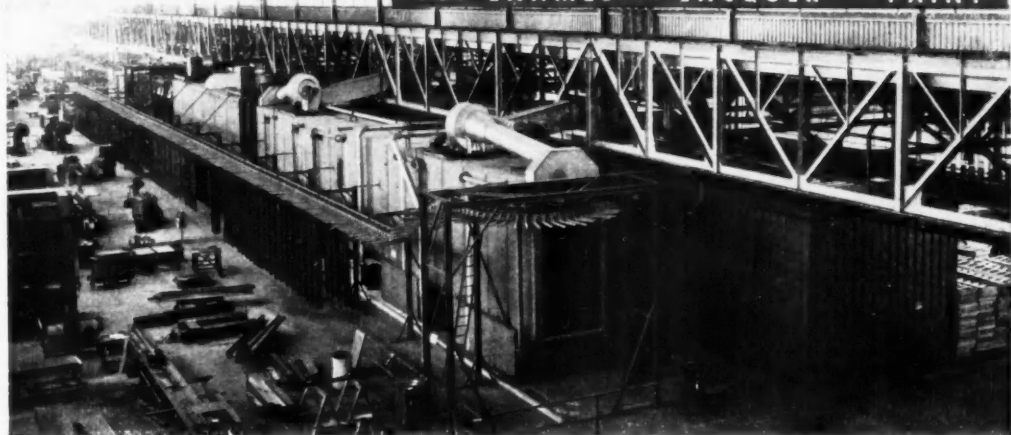
MANUFACTURING COMPANY
SAGINAW DIVISION

5771 French Road • Detroit 26, Michigan

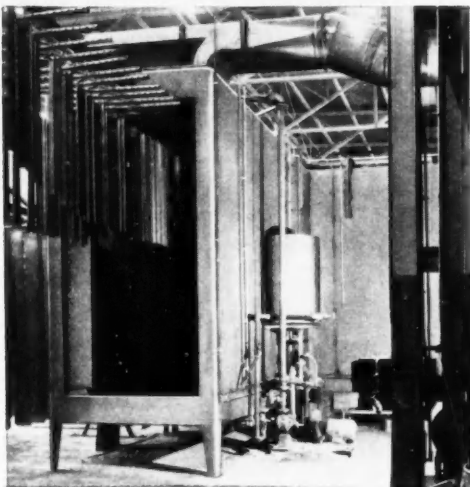
It has been Eaton's privilege to work in close cooperation with vehicle and engine manufacturers not only in the production of tappets, hydraulic valve lifters, valves, and other precision engine parts, but also in the design and development of parts which have contributed to improved performance and longer life for internal combustion engines in every field of service.

COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT



General view of the Complete Mahon Finishing System installed in the Martin-Parry Corporation's plant, Toledo, Ohio. This system consists of Metal Cleaning and Chemical Preparation Equipment, Dry-off Oven, Flow Coating Machine, Drip Area Enclosure, and Final Bake Oven.



Mahon Flow-Coating Machine for applying Prime Coat on Steel Wall Panels, Metal Doors and Frames, and other Parts—part of the Complete Mahon Finishing System in the Martin-Parry plant, Toledo, Ohio.

... Combination Gas and Oil Fired!

Here is another typical Mahon solution of a finishing problem which involved prime coating metal doors and frames, metal wall panels up to ten feet in length, and a variety of other metal parts of many shapes and sizes. Combination gas and oil fired heating units were engineered into this entire system—for Metal Cleaning and Chemical Preparation Equipment as well as Dry-off and Final Bake Ovens . . . change over from gas firing to oil firing may be accomplished in a matter of seconds without interrupting production. When you contemplate new, modern finishing equipment—regardless of what your finishing problem may be—remember that Mahon has pioneered development in this highly specialized field for twenty-eight years . . . this broad experience, which covers many diversified industries and is world-wide in scope, together with constant experimental research, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. Better planning, better engineering, and a better and more economical job of finishing is the result. See Sweet's Mech. Ind. File for complete information.

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Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Chemical Preparation Equipment, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply System, Drying and Baking Ovens, and Paint Reclamation System. Also, Core Ovens, Hydro-Foam Dust Collectors, and many other Units of Special Production Equipment.

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Selecting the right size seamless tube to make hollow cylindrical parts is not as simple as you might think.

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How to be sure of getting the *right* size tube? Consult with Timken. Timken tube engineering service will analyze the specifications for your finished part and recommend the most economical size Timken tubing for the job. Chances are it will be a lighter weight tube than you're using now . . . with a sizeable saving in material cost.

You get the saving—we take the risk

We take all the risk! We guarantee that the Timken tube we give you will clean up to your finished dimensions!

Timken tube engineering service can save you material and machining time, and give you guaranteed clean-up for three main reasons:

First, one of our engineering departments devotes its full time to the calculation of the most economical tube size for your particular requirements. These men have had years of contact with mechanical tubing problems in practically every large scale manufacturing industry.

Second, every step in the manufacture of Timken tubing is rigidly controlled in our own mills, resulting

in outstanding uniformity of dimensions. This greater uniformity permits a minimum stock removal in the Timken tubing you use.

Third, Timken has the largest assortment of roll sizes of any mechanical tubing mill in the country. This means you have the largest selection of hot-rolled tube sizes to choose from.

90% of Timken tubing bought this way

So fully proved and widely recognized are the advantages of Timken tube engineering service that today 90% of Timken mechanical tubing is bought on that basis.

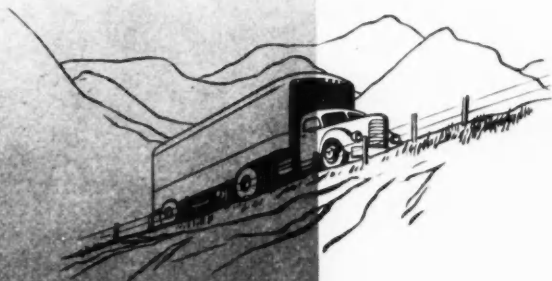
Let Timken tube engineering service make an analysis of your requirements and recommend the most economical size tube for your job, guaranteed to clean up. No cost or obligation. Simply provide the data indicated below to The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

All you have to do is give us this information:

- 1 FINISHED PART DIMENSIONS.** Maximum OD x Minimum ID x Length. Blue print or sketch preferred. Dimensions should include applicable tolerances and should be identified as "finish machined" or "finish ground".
- 2 MACHINING POSITION.** Complete sequence of operations when practical.
- 3 CONDITION DESIRED.** Hot rolled, cold drawn, rough turned, or rotorolled.
- 4 GRADE AND QUALITY OF STEEL.**

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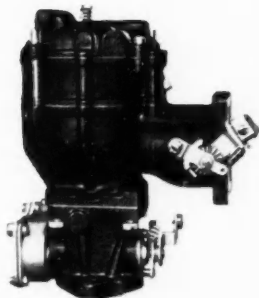




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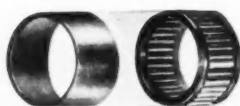


FOR THE AUTOMOTIVE INDUSTRY

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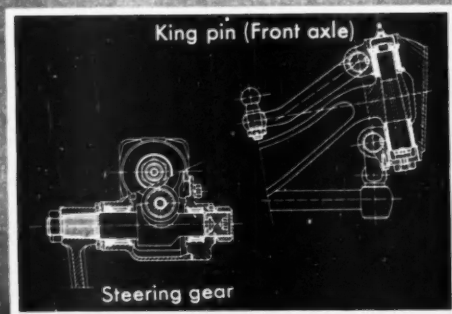
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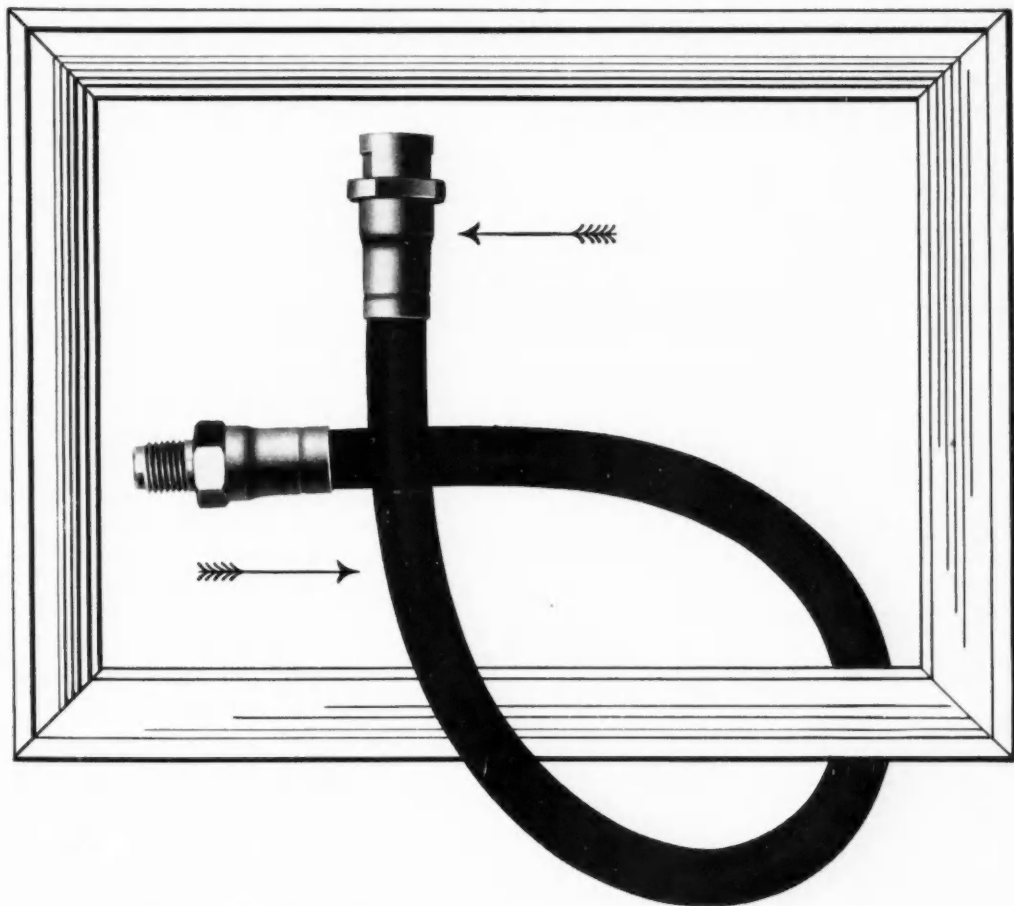
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. . . and the famous "whip test," in which *standard production lengths of hose are flexed violently 48,000 times per hour under pressure*.

Such tests, plus Inland's unmatched design and production standards, guarantee the safety, service and salability of Delco Brake Hose. Be sure to specify it as original equipment.

INLAND MANUFACTURING DIVISION, General Motors Corporation, DAYTON, OHIO

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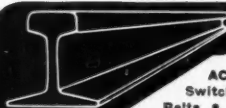
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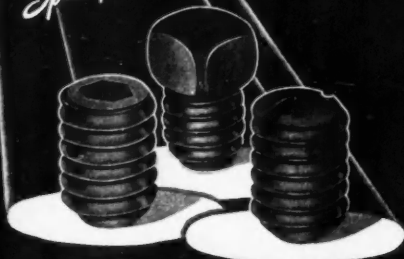
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Spotlight Progressive Industry

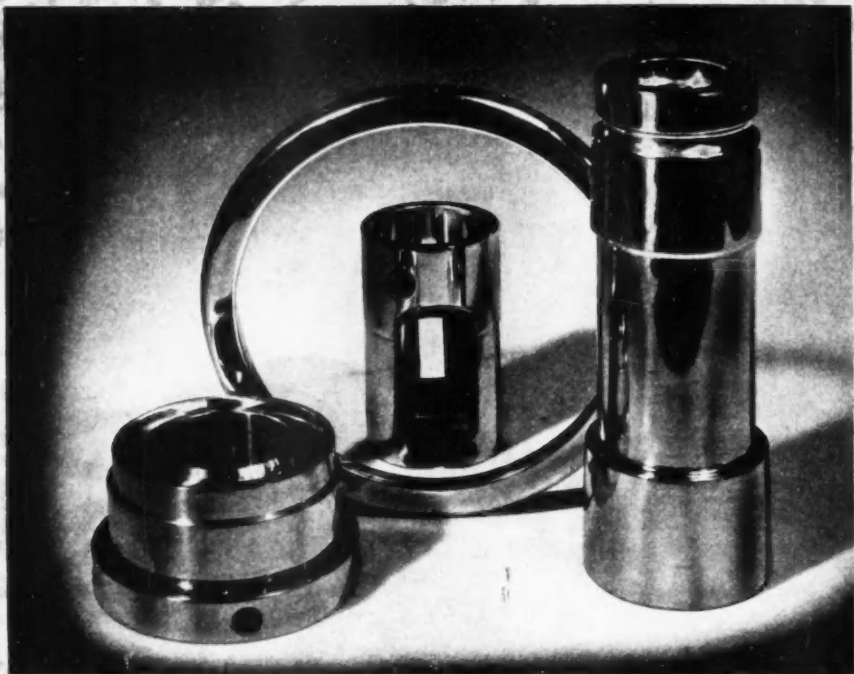


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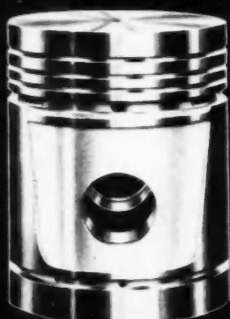
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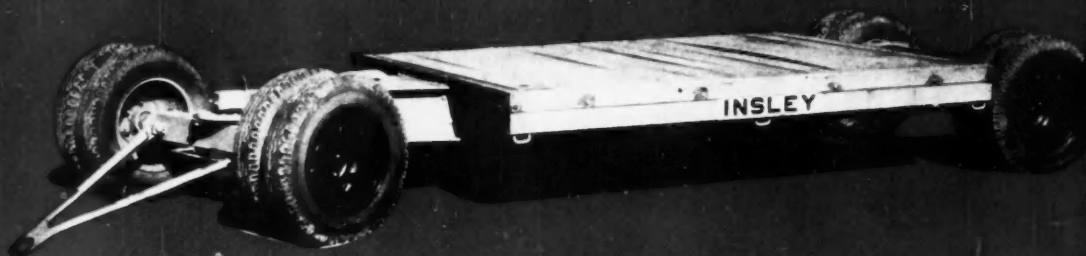
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